http://kicp-workshops.uchicago.edu/IDM2012/

CONFERENCE MATERIALS

International Advisory Committee

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List of Participants

1.	Kevork N. Abazajian	University of California, Irvine
2.	Sarah Andreas	DESY Hamburg
3.	Katsushi Arisaka	UCLA
4.	Zoltan Arvay	SBC Cluster
5.	Ritoban Basu Thakur	Fermilab / UIUC
6.	James Battat	Bryn Mawr College
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10.	Lars Bergstrom	Stockholm University
11.	Nicolas Bernal	University of Bonn, Germany
12.	Gianfranco Bertone	University of Amsterdam
13.	Mark Boulay	Queen's University
14.	Daniel Brandt	KIPAC, SLAC National Accelerator Lab, Stanford University
15.	Steve Brice	Fermilab
16.	James Buckley	Washington University
17.	Matthew Buckley	Fermi National Accelerator Laboratory
18.	Ran Budnik	Columbia university
19.	Carmen Carmona-Benitez	Case Western Reserve University
20.	Riccardo Cerulli	INFN-LNGS
21.	Hassan Chagani	University of Minnesota
22.	Ilias Cholis	SISSA (Scuola Internazionale Superiore di Studi Avanzati)
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25.	Peter Cooper	Fermilab
26.	Randy C Cotta	SLAC/Stanford
27.	Michael B. Crisler	Fermilab
28.	Alessandro Cuoco	Oskar Kein Center for CosmoParticle Physics
29.	Priscilla B Cushman	University of Minnesota
30.	Eric Dahl	University of Chicago
31.	Jordan Damgov	Texas Tech University
32.	Matthias Danninger	Stockholm University

33.	Basudeb Dasgupta	CCAPP, Ohio State University
34.	Hannah Diehl	International Academy
35.	Scott Dodelson	Fermi National Accelerator Laboratory
36.	Alexei Dorofeev	Colorado State University
37.	Joakim Edsjo	Oskar Klein Centre / Stockholm University
38.	Klaus Eitel	Karlsruhe Institute of Technology
39.	Rouven Essig	Yang Institute for Theoretical Physics, Stony Brook
40.	Juan Estrada	Fermilab
41.	Carlos H Faham	Brown University
42.	Nicole E Fields	University of Chicago
43.	Douglas P Finkbeiner	Harvard University
44.	Carlos S Frenk	Durham University
45.	Jean-Luc Gauvreau	Occidental College
46.	Alex Geringer-Sameth	Brown University
47.	Karen Gibson	Case Western Reserve University
48.	German A. Gomez-Vargas	Universidad Autonoma de Madrid / IFT UAM-CSIC / INFN Roma Tor Vergata
49.	Paolo Gondolo	University of Utah
50.	Andreas Goudelis	DESY - Hamburg
51.	Luca Grandi	Princeton University
52.	Jeter Hall	Fermi National Accelerator Laboratory
53.	John L Harton	Colorado State University
54.	Shawn W Henderson	Massachusetts Institute of Technology
55.	Scott A Hertel	MIT
56.	Geertje Heuermann	Institute of Experimental nuclear Physics (IEKP) of the Karlsruhe Institut fur Technologie (KIT)
57.	Richard Hill	University of Chicago
58.	Andrew Hime	Los Alamos National Laboratory
59.	Akira Hitachi	Kochi Medical School
60.	Craig J Hogan	Fermilab / Univ. of Chicago
61.	Daniel Holz	University of Chicago
62.	Dan Hooper	Fermi National Accelerator Laboratory
63.	Lauren L Hsu	Fermi National Accelerator Laboratory
64.	Mia Ihm	UC Berkeley
65.	Fabio Iocco	Oskar Klein Center for CosmoParticle Physics

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67.	Chris Kelso	Fermi National Accelerator Laboratory
68.	Alexander Khromov	NRNU "MEPhI"
69.	Alexander A. Kirillov	National Research Nuclear University "MEPhI"
70.	Manungu Kiveni	Syracuse University
71.	Rocky Kolb	University of Chicago/KICP
72.	Joachim Kopp	Fermilab
73.	Andrei Kounine	Massachusetts Institute of Technology
74.	Savvas M Koushiappas	Brown University
75.	Jonathan Kozaczuk	UC Santa Cruz
76.	Hans Kraus	University of Oxford
77.	Carsten B Krauss	University of Alberta
78.	Andrey Kravtsov	University of Chicago
79.	Abram Krislock	Stockholm University
80.	Vitaly Kudryavtsev	University of Sheffield
81.	Michael Kuhlen	Theoretical Astrophysics Center, UC Berkeley
82.	Ranjan Laha	CCAPP & Dept. of Physics, Ohio State University
83.	Eric R Lee	University of New Mexico
84.	Katalin Leposa	SBC Cluster
85.	Tongyan Lin	Harvard University
86.	Steven K Linden	Boston University
87.	Timothy Linden	UC - Santa Cruz
88.	Hugh Lippincott	Fermilab
89.	Mariangela Lisanti	Princeton Center for Theoretical Science
90.	Zuowei Liu	McGill University
91.	Ben Loer	FNAL
92.	Dinesh Loomba	University of New Mexico
93.	Sarah A Malik	The Rockefeller University
94.	David Malling	Brown University
95.	Reina Maruyama	University of Wisconsin-Madison
96.	Antonio Melgarejo	Columbia University
97.	Eric H Miller	University of New Mexico
98.	Jonathan A Miller	Vrije Universiteit Brussel

99.	Noah P Mitchell	St. Olaf College; U. Chicago
100.	Kentaro Miuchi	Kobe University
101.	Emmanuel Moulin	CEA Saclay, IRFU
102.	Simona Murgia	KIPAC, Stanford University
103.	Tatsuhhiro Naka	Nagoya University
104.	Russell G Neilson	University of Chicago
105.	Angela Olinto	Kavli Institute for Cosmological Physics
106.	Sean M Paling	Boulby Underground Science Facility
107.	Kimberly J Palladino	MIT
108.	Jong-Chul Park	Korea Institute for Advanced Study
109.	Stephen Parke	Fermilab
110.	Richard Partridge	SLAC National Accelerator Laboratory
111.	Miguel Pato	Technical University Munich
112.	Evan K Pease	Yale University
113.	Katherin Pech	Case Western Reserve University
114.	Annika Peter	UC Irvine
115.	Nguyen S Phan	University of New Mexico
116.	Zachary Pierpoint	University of Wisconsin- Madison
117.	Reinard Primulando	College of William and Mary & Fermilab
118.	Paolo Privitera	Kavli Institute for Cosmological Physics
119.	Stefano Profumo	University of California, Santa Cruz
120.	Chris Purcell	University of Pittsburgh
121.	Hang Qiu	Southern Methodist University
122.	Matthew Reece	Harvard University
123.	Ted Ressell	Kavli Institute for Cosmological Physics
124.	Alan E Robinson	University of Chicago
125.	Leslie J Rosenberg	University of Washington
126.	Carsten Rott	Ohio State University / CCAPP
127.	Jaime Ruz Armendariz	Lawrence Livermore National Laboratory
128.	Sara Rydbeck	DESY
129.	Michael H Salamon	US Department of Energy
130.	Richard N Saldanha	LNGS, Italy
131.	David Sanford	Caltech

132.	Veronique Sanglard	Institut de Physique Nucleaire de Lyon
133.	Daniel Santos	LPSC/UJF/CNRS
134.	Maria Luisa Sarsa	University of Zaragoza
135.	Christopher Savage	Oskar Klein Centre, Stockholm University
136.	Stefano Scopel	Sogang University Korea
137.	Silva Scorza	Southern Methodist University
138.	Pat Scott	McGill University
139.	Osamu Seto	Hokkai-Gakuen University
140.	Bibhushan Shakya	Cornell University
141.	Chung-Lin Shan	Academia Sinica
142.	Seodong Shin	Seoul National University
143.	Tom Shutt	Case Western Reserve University
144.	Jennifer Siegal-Gaskins	Caltech
145.	Sofia Sivertsson	KTH / Stockholm University
146.	Andrew W Smith	University of Utah
147.	Daniel P. Snowden-Ifft	Occidental College
148.	Andrew Sonnenschein	Fermilab
149.	Douglas D Spolyar	Fermi National Accelerator Laboratory
150.	Christian Strandhagen	Kepler Center for Astro and Particle Physics Tuebingen University
151.	Meng Su	Harvard University/MIT
152.	Yoichiro Suzuki	Kamioka Observatory, ICRR, U. of Tokyo
153.	Matthew M Szydagis	UC Davis
154.	Tim M.P. Tait	University of California, Irvine
155.	Marco Taoso	University of British Columbia
156.	Brian Tennyson	Yale University
157.	David Tran	University of Minnesota
158.	Eric Vazquez-Jauregui	SNOLAB
159.	Aion Viana	CEA, IRFU/SPP
160.	Jussi Virkajarvi	CP3-Origins & DIAS, University of Southern Denmark
161.	Julia K Vogel	Lawrence Livermore National Laboratory
162.	Philip von Doetinchem	UC Berkeley, Space Sciences Laboratory
163.	Joseph J Walding	Royal Holloway, University of London
164.	Lian-Tao Wang	Kavli Institute for Cosmological Physics

165.	Mei-Yu Wang	University of Pittsburgh
166.	Christoph Weniger	Max Planck Institute for Physics, Munich
167.	Daniel Whiteson	UC Irvine
168.	Ubi Wichoski	Laurentian University
169.	Matthew Williams	Colorado State University
170.	Michael Witherell	UC Santa Barbara
171.	Wei Xue	Physics Department, McGill University
172.	Qiaoli Yang	University of Florida
173.	Chiu-Tien Yu	Fermilab/UW-Madison
174.	Viktor F Zacek	Universite de Montreal
175.	Gabrijela Zaharijas	ICTP, Trieste
176.	Hannes-S. Zechlin	University of Hamburg, Germany
177.	Andrew Zentner	University of Pittsburgh
178.	Donghai Zhao	Shanghai Astronomical Observatory
179.	Jing Zhou	KICP
180.	Benjamin J Zitzer	Argonne National Laboratory

PLENARY SESSIONS

July 23-27, 2012 @ Holiday Inn Mart Plaza, Chicago, IL

Monday - July 23, 2012

8:30 AM - 9:00 AM *CONTINENTAL BREAKFAST*
(Wolf Point Reception area, 15th floor)

MORNING PLENARY SESSION I
Convener: Dan Hooper
(Wolf Point Ballroom, 15th floor)

9:00 AM - 9:10 AM *BRIEF INTRODUCTION*

9:10 AM - 9:35 AM **Priscilla B Cushman**, University of Minnesota
Plenary Talk: ***SuperCDMS: Progress and Future Directions***

9:35 AM - 10:00 AM **Antonio Melgarejo**, Columbia University
Plenary Talk: ***New results from XENON100***

10:00 AM - 10:25 AM **Klaus Eitel**, Karlsruhe Institute of Technology
Plenary Talk: ***The EDELWEISS dark matter search***

10:25 AM - 11:00 AM *COFFEE BREAK*
(Wolf Point Reception area, 15th floor)

MORNING PLENARY SESSION II
Convener: Daniel Bauer
(Wolf Point Ballroom, 15th floor)

11:00 AM - 11:25 AM **Joerg Jaeckel**, IPPP/Durham University
Plenary Talk: ***Axions, WISPs and other stuff***

11:25 AM - 11:50 AM **Aaron S Chou**, Fermilab
Plenary Talk: ***The Hunt for axions***

11:50 AM - 12:15 PM **Leslie J Rosenberg**, University of Washington
Plenary Talk: ***Status of ADMX***

12:15 PM - 2:00 PM *LUNCH*

2:00 PM - 2:15 PM *DESSERT & COFFEE*
(Wolf Point Reception area, 15th floor)

2:15 PM - 6:00 PM **AFTERNOON PARALLEL SESSIONS**
* **Direct Detection I,** ***Convener: Christopher Savage*** (Wolf Point Ballroom, 15th floor)
* **Indirect Detection I,** ***Convener: Paolo Gondolo*** (Western Stage room, 14th floor)

Tuesday - July 24, 2012

8:30 AM - 9:00 AM	*CONTINENTAL BREAKFAST* (Wolf Point Reception area, 15th floor)
	MORNING PLENARY SESSION I ***Convener: Carsten Krauss*** (Wolf Point Ballroom, 15th floor)
9:00 AM - 9:25 AM	**Riccardo Cerulli**, INFN-LNGS *Plenary Talk:* ***Dark matter signal in DAMA/LIBRA***
9:25 AM - 9:50 AM	**Christian Strandhagen**, Kepler Center for Astro and Particle Physics Tuebingen University *Plenary Talk:* ***The CRESST-II experiment - status update***
9:50 AM - 10:15 AM	**Juan Collar**, Kavli Institute for Cosmological Physics *Plenary Talk:* ***New results from CoGeNT***
10:15 AM - 10:45 AM	*COFFEE BREAK* (Wolf Point Reception area, 15th floor)
	MORNING PLENARY SESSION II ***Convener: Douglas Finkbeiner*** (Wolf Point Ballroom, 15th floor)
10:45 AM - 11:10 AM	**Joachim Kopp**, Fermilab *Plenary Talk:* ***Direct detection of light WIMPs***
11:10 AM - 11:35 AM	**Jennifer Siegal-Gaskins**, Caltech *Plenary Talk:* ***Dark matter searches with Fermi***
11:35 AM - 12:00 PM	**James Buckley**, Washington University *Plenary Talk:* ***Dark matter searches with ACTs***
12:00 PM - 12:25 PM	**Stefano Profumo**, University of California, Santa Cruz *Plenary Talk:* ***Fermi from a theorist's perspective***
12:25 PM - 2:00 PM	*LUNCH*
2:00 PM - 2:15 PM	*DESSERT & COFFEE* (Wolf Point Reception area, 15th floor)
2:15 PM - 6:00 PM	**AFTERNOON PARALLEL SESSIONS** * **Direct Detection II,** ***Convener: Lauren Hsu*** (Wolf Point Ballroom, 15th floor) * **Indirect Detection II,** ***Convener: James Buckley*** (Western Stage room, 14th floor) * **Particle Physics,** ***Convener: Stefano Profumo*** (Steamboat room, 14th floor)

Wednesday - July 25, 2012

8:30 AM - 9:00 AM	*CONTINENTAL BREAKFAST* (Wolf Point Reception area, 15th floor)
	MORNING PLENARY SESSION I ***Convener: Andrey Kravtsov*** (Wolf Point Ballroom, 15th floor)
9:00 AM - 9:25 AM	**Carlos S Frenk**, Durham University *Plenary Talk:* ***Status of dark matter simulations***
9:25 AM - 9:50 AM	**Michael Kuhlen**, Theoretical Astrophysics Center, UC Berkeley *Plenary Talk:* ***Status of dark matter simulations***
9:50 AM - 10:15 AM	**Daniel P. Snowden-Ifft**, Occidental College *Plenary Talk:* ***Overview of directional dark matter detectors***
10:15 AM - 10:45 AM	*COFFEE BREAK* (Wolf Point Reception area, 15th floor)
	MORNING PLENARY SESSION II ***Convener: Hans Kraus*** (Wolf Point Ballroom, 15th floor)
10:45 AM - 11:10 AM	**Carsten B Krauss**, University of Alberta *Plenary Talk:* ***Constraints on low-mass WIMPs from PICASSO***
11:10 AM - 11:35 AM	**Yoichiro Suzuki**, Kamioka Observatory, ICRR, U. of Tokyo *Plenary Talk:* ***The XMASS Experiment***
11:35 AM - 12:00 PM	**Annika Peter**, UC Irvine *Plenary Talk:* ***Astrophysical uncertainties in dark matter detection***
12:00 PM - 12:25 PM	**Kevork N. Abazajian**, University of California, Irvine *Plenary Talk:* ***Status of sterile neutrino dark matter***
12:25 PM - 2:00 PM	*LUNCH*
2:00 PM - 2:15 PM	*DESSERT & COFFEE* (Wolf Point Reception area, 15th floor)
2:15 PM - 6:00 PM	**AFTERNOON PARALLEL SESSIONS** * **Direct Detection III,** ***Convener: Vitaly Kudryavtsev*** (Wolf Point Ballroom, 15th floor) * **Particle Physics/Direct Detection I,** ***Convener: Matthew Buckley*** (Western Stage room, 14th floor)

Thursday - July 26, 2012

8:30 AM - 9:00 AM	*CONTINENTAL BREAKFAST* (Wolf Point Reception area, 15th floor)
	MORNING PLENARY SESSION I ***Convener: Lars Bergstrom*** (Wolf Point Ballroom, 15th floor)
9:00 AM - 9:25 AM	**Tim M.P. Tait**, University of California, Irvine *Plenary Talk:* ***Dark matter searches at the LHC (theory)***
9:25 AM - 9:50 AM	**Daniel Whiteson**, UC Irvine *Plenary Talk:* ***Dark Matter searches at the LHC (experiment)***
9:50 AM - 10:15 AM	**Matthew Reece**, Harvard University *Plenary Talk:* ***Supersymmetry: Where Do We Stand?***
10:15 AM - 10:45 AM	*COFFEE BREAK* (Wolf Point Reception area, 15th floor) *"**Meet and Greet**" the editors of the Physics of the Dark Universe journal (Elsevier Table, Wolf Point Registration Area, 15th floor). Editors will also be available from 2:15 PM - 2:45 PM.*
	MORNING PLENARY SESSION II ***Convener: Daniel Snowden-Ifft*** (Wolf Point Ballroom, 15th floor)
10:45 AM - 11:10 AM	**Karen Gibson**, Case Western Reserve University *Plenary Talk:* ***The LUX Experiment***
11:10 AM - 11:35 AM	**Richard N Saldanha**, LNGS, Italy *Plenary Talk:* ***Status of Darkside***
11:35 AM - 12:00 PM	**Andrew Hime**, Los Alamos National Laboratory *Plenary Talk:* ***CLEAN Detection of Dark Matter***
12:00 PM - 2:00 PM	*LUNCH*
2:00 PM - 2:15 PM	*DESSERT & COFFEE* (Wolf Point Reception area, 15th floor)
2:15 PM - 5:35 PM	**AFTERNOON PARALLEL SESSIONS** * **Direct Detection IV,** ***Convener: Viktor Zacek*** (Wolf Point Ballroom, 15th floor) * **Indirect Detection III,** ***Convener: Douglas Spolyar*** (Western Stage room, 14th floor)
	DINNER at the Adler Planetarium, 1300 South Lake Shore Drive, Chicago, IL 60605
5:45 PM	*SHUTTLES BOARD* Shuttle buses will be parked just East of the Holiday Inn Mart Plaza entrance on Orleans Street

6:00 PM	*SHUTTLES DEPART* for the Adler Planetarium
6:30 PM - 7:30 PM	*HORS D'OEUVRES*
7:30 PM - 9:30 PM	*DINNER*
10:00 PM	*SHUTTLES BOARD* in front of the Adler Planetarium main entrance
10:15 PM	*SHUTTLES DEPART & RETURN* to the Holiday Inn Mart Plaza

Friday - July 27, 2012

8:30 AM - 9:00 AM	*CONTINENTAL BREAKFAST* (Wolf Point Reception area, 15th floor)
9:00 AM - 12:00 PM	**MORNING PARALLEL SESSIONS** * **Particle Physics/Direct Detection II, *Convener: Joakim Edsjo*** (Wolf Point Ballroom, 15th floor) * **Structure and Stars, *Convener: Carlos Frenk*** (Steamboat room, 14th floor) * **Indirect Detection IV, *Convener: Mariangela Lisanti*** (Western Stage room, 14th floor)
12:00 PM - 1:45 PM	*LUNCH*
1:45 PM - 2:00 PM	*DESSERT & COFFEE* (Wolf Point Reception area, 15th floor)
	AFTERNOON PLENARY SESSION I ***Convener: Tim Tait*** (Wolf Point Ballroom, 15th floor)
2:00 PM - 2:25 PM	**Douglas P Finkbeiner**, Harvard University *Plenary Talk:* ***Fermi jets and the 130 GeV line***
2:25 PM - 2:50 PM	**Andrei Kounine**, Massachusetts Institute of Technology *Plenary Talk:* ***Status of AMS-02***
2:50 PM - 3:15 PM	**Marco Taoso**, University of British Columbia *Plenary Talk:* ***Dark matter with radio telescopes***
3:15 PM - 3:45 PM	*COFFEE BREAK* (Wolf Point Reception area, 15th floor)
	AFTERNOON PLENARY SESSION II ***Convener: Rocky Kolb*** (Wolf Point Ballroom, 15th floor)
3:45 PM - 4:10 PM	**Carsten Rott**, Ohio State University / CCAPP *Plenary Talk:* ***Latest Results from IceCube***
4:10 PM - 4:35 PM	**Gianfranco Bertone**, University of Amsterdam *Plenary Talk:* ***Summary Talk***

PARALLEL SESSIONS

July 23-27, 2012 @ Holiday Inn Mart Plaza, Chicago, IL

Monday - July 23, 2012

DIRECT DETECTION I
Convener: Christopher Savage
(Wolf Point Ballroom, 15th floor)

2:15 PM - 2:35 PM	**Daniel Brandt**, KIPAC, SLAC National Accelerator Lab, Stanford University ***Understanding the Physics of SuperCDMS SNOLAB Detectors***
2:40 PM - 3:00 PM	**Hassan Chagani**, University of Minnesota ***SuperCDMS-SNOLAB: Road to 100 mm Germanium Detectors***
3:05 PM - 3:25 PM	**Manungu Kiveni**, Syracuse University ***Reanalysis of CDMS II data***
3:30 PM - 3:50 PM	**Nicole E Fields**, University of Chicago ***A low-energy analysis of CDMS data***
3:55 PM - 4:15 PM	**Scott A Hertel**, MIT ***Search for Annual Modulation in Low-Energy CDMS-II Data***
4:20 PM - 4:40 PM	**Vitaly Kudryavtsev**, University of Sheffield ***Background studies for the EDELWEISS dark matter experiment***
4:45 PM - 5:05 PM	**Veronique Sanglard**, Institut de Physique Nucleaire de Lyon ***EDELWEISS-II WIMP search at low energy***
5:10 PM - 5:30 PM	**Silva Scorza**, Southern Methodist University ***SuperCDMS-SNOLAB - an active neutron veto shield design***
5:35 PM - 5:55 PM	**Hans Kraus**, University of Oxford ***EURECA***

INDIRECT DETECTION I
Convener: Paolo Gondolo
(Western Stage room, 14th floor)

2:15 PM - 2:35 PM	**Matthias Danninger**, Stockholm University ***Search for Dark Matter Captured in the Sun with the IceCube Neutrino Observatory***
2:40 PM - 3:00 PM	**Sofia Sivertsson**, KTH / Stockholm University ***WIMP diffusion in the Solar System and the neutrino signal from the Sun and the Earth***
3:05 PM - 3:25 PM	**Joakim Edsjo**, Oskar Klein Centre / Stockholm University ***Neutrino searches for dark matter***
3:30 PM - 3:50 PM	**Jonathan A Miller**, Vrije Universiteit Brussel ***Search for Secluded Dark Matter in the Sun using the IceCube Neutrino Observatory***
3:55 PM - 4:15 PM	**Basudeb Dasgupta**, CCAPP, Ohio State University ***Probing DM in Galaxy Clusters using Neutrino Telescopes***

Tuesday - July 24, 2012

DIRECT DETECTION II
Convener: Lauren Hsu
(Wolf Point Ballroom, 15th floor)

2:15 PM - 2:35 PM **Kimberly J Palladino**, MIT
A discussion of the DEAP-3600 calibration systems.

2:40 PM - 3:00 PM **Mark Boulay**, Queen's University
DEAP-3600 Dark Matter Search at SNOLAB

3:05 PM - 3:25 PM **Akira Hitachi**, Kochi Medical School
The electronic LET for slow ions in dark matter detector media

3:30 PM - 3:50 PM **Dinesh Loomba**, University of New Mexico
The DRIFT Dark Matter Search

3:55 PM - 4:15 PM **Daniel Santos**, LPSC/UJF/CNRS
Directional Detection of DM with MIMAC

4:20 PM - 4:40 PM **Kentaro Miuchi**, Kobe University
NEWAGE

4:45 PM - 5:05 PM **Shawn W Henderson**, Massachusetts Institute of Technology
Surface Commissioning of the DMTPC 4-Shooter Directional Dark Matter Detector Prototype

5:10 PM - 5:30 PM **Tatsuhhiro Naka**, Nagoya University
Directional Dark Matter Search with Nuclear Emulsion

5:35 PM - 5:55 PM **Steven K Linden**, Boston University
Status Report on the MiniCLEAN Experiment

INDIRECT DETECTION II
Convener: James Buckley
(Western Stage room, 14th floor)

2:15 PM - 2:35 PM **Lars Bergstrom**, Stockholm University
Spectral gamma-ray signatures in dark matter detection - a review

2:40 PM - 3:00 PM **Timothy Linden**, UC - Santa Cruz
Indirect Detection of Dark Matter at the Galactic Center

3:05 PM - 3:25 PM **Christoph Weniger**, Max Planck Institute for Physics, Munich
A tentative gamma-ray line from dark matter annihilation at the Fermi Large Area Telescope

3:30 PM - 3:50 PM **Gabrijela Zaharijas**, ICTP, Trieste
Constraints on dark matter annihilation and decay in the Milky Way halo

3:55 PM - 4:15 PM **Meng Su**, Harvard University/MIT
Evidence for Gamma-ray Jets in Our Milky Way

4:20 PM - 4:40 PM **Emmanuel Moulin**, CEA Saclay, IRFU
Indirect dark matter searches with current imaging atmospheric Cherenkov telescopes

4:45 PM - 5:05 PM **Emmanuel Moulin**, CEA Saclay, IRFU
Search for Dark Matter Annihilation Signals from the Fornax Galaxy Cluster with H.E.S.S.

5:10 PM - 5:30 PM **Pat Scott**, McGill University
Cosmology with ultracompact minihalos

PARTICLE PHYSICS
Convener: Stefano Profumo
(Steamboat room, 14th floor)

2:15 PM - 2:35 PM **Jordan Damgov**, Texas Tech University
Recent results from a search for Dark Matter production in the CMS experiment

2:40 PM - 3:00 PM **Sara Rydbeck**, DESY
The inert doublet model and the role of multileptons at the LHC

3:05 PM - 3:25 PM	**Stefano Scopel**, Sogang University Korea ***Phenomenology of light neutralinos in view of recent results at the CERN Large Hadron Collider***
3:30 PM - 3:50 PM	**Jussi Virkajarvi**, CP3-Origins & DIAS, University of Southern Denmark ***Invisible Higgs and Dark Matter***
3:55 PM - 4:15 PM	**Randy C Cotta**, SLAC/Stanford ***Experimental Bounds on Chi-Chi-V-V***
4:20 PM - 4:40 PM	**Jaime Ruz Armendariz**, Lawrence Livermore National Laboratory ***Constraints on the axion-electron coupling for the non-hadronic models with CAST***
4:45 PM - 5:05 PM	**Julia K Vogel**, Lawrence Livermore National Laboratory ***The International Axion Observatory (IAXO)***
5:10 PM - 5:30 PM	**Qiaoli Yang**, University of Florida ***Axion BEC: a model beyond CDM***

Wednesday - July 25, 2012

DIRECT DETECTION III
Convener: Vitaly Kudryavtsev
(Wolf Point Ballroom, 15th floor)

2:15 PM - 2:35 PM **Ran Budnik**, Columbia university
The XENON1T experiment

2:40 PM - 3:00 PM **Carmen Carmona-Benitez**, Case Western Reserve University
LUX detector, Installation and Operation

3:05 PM - 3:25 PM **Carlos H Faham**, Brown University
Alpha tomography, calibrations and backgrounds in the LUX dark matter experiment

3:30 PM - 3:50 PM **Matthew M Szydagis**, UC Davis
Calibrations of the LUX Detector on the Surface

3:55 PM - 4:15 PM **Sean M Paling**, Boulby Underground Science Facility
Boulby Deep Underground Science Facility: Status and Future Plans

4:20 PM - 4:40 PM **Tom Shutt**, Case Western Reserve University
The LZ Experiment

4:45 PM - 5:05 PM **David Malling**, Brown University
Background Characterization and Rejection in the LZ Detector

5:10 PM - 5:30 PM **Katsushi Arisaka**, UCLA
MAX and XAX: Dark matter and neutrino observatory based on multi-ton liquid xenon and liquid argon

PARTICLE PHYSICS/DIRECT DETECTION I
Convener: Matthew Buckley
(Western Stage room, 14th floor)

2:15 PM - 2:35 PM **Nicolas Bernal**, University of Bonn, Germany
Phenomenology of WIMPy baryogenesis models

2:40 PM - 3:00 PM **Paolo Gondolo**, University of Utah
Phenomenology of light WIMPs

3:05 PM - 3:25 PM **Andreas Goudelis**, DESY - Hamburg
The Inert Doublet Model of Dark Matter Beyond Tree-level

3:30 PM - 3:50 PM **Jonathan Kozaczuk**, UC Santa Cruz
Exploring the Dark Matter - Electroweak Baryogenesis Connection in Supersymmetry

3:55 PM - 4:15 PM **Jong-Chul Park**, Korea Institute for Advanced Study
Assisted freeze-out

4:20 PM - 4:40 PM **Osamu Seto**, Hokkai-Gakuen University
Initially asymmetric dark matter

4:45 PM - 5:05 PM **Seodong Shin**, Seoul National University
Dark matter in the PQMSSM in anomaly mediation

5:10 PM - 5:30 PM **Zuowei Liu**, McGill University
Millicharged Atomic Dark Matter

5:35 PM - 5:55 PM **Wei Xue**, Physics Department, McGill University
An optimistic CoGeNT analysis

Thursday - July 26, 2012

DIRECT DETECTION IV
Convener: Viktor Zacek
(Wolf Point Ballroom, 15th floor)

2:15 PM - 2:35 PM **Michael B. Crisler**, Fermilab
Dark Matter Search Results from the COUPP-4kg Bubble Chamber at SNOLAB

2:40 PM - 3:00 PM **Hugh Lippincott**, Fermilab
COUPP Iodine Recoil Threshold Experiment

3:05 PM - 3:25 PM **Alan E Robinson**, University of Chicago
COUPP Carbon and Fluorine Recoil Thresholds

3:30 PM - 3:50 PM **Andrew Sonnenschein**, Fermilab
COUPP-60

3:55 PM - 4:15 PM **Eric Vazquez-Jauregui**, SNOLAB
COUPP500: A 500kg CF3I Bubble Chamber

4:20 PM - 4:40 PM **Juan Estrada**, Fermilab
Direct Dark Matter Search with Charge Couple Devices

4:45 PM - 5:05 PM **Ritoban Basu Thakur**, Fermilab / UIUC
The CDMSlite experiment

5:10 PM - 5:30 PM **Maria Luisa Sarsa**, University of Zaragoza
Background model for a NaI(Tl) detector in the frame of the ANAIS experiment

INDIRECT DETECTION III
Convener: Douglas Spolyar
(Western Stage room, 14th floor)

2:15 PM - 2:35 PM **Alex Geringer-Sameth**, Brown University
Results of continuum and line WIMP searches in dwarf galaxies with Fermi

2:40 PM - 3:00 PM **Ilias Cholis**, SISSA (Scuola Internazionale Superiore di Studi Avanzati)
Extracting limits on dark matter annihilation from dwarf spheroidal galaxies

3:05 PM - 3:25 PM **Alexander A. Kirillov**, National Research Nuclear University "MEPhI"
Small scale dark matter clumps and its gamma ray signals

3:30 PM - 3:50 PM **Hannes-S. Zechlin**, University of Hamburg, Germany
Dark matter subhalos: the observational challenge

3:55 PM - 4:15 PM **Ranjan Laha**, CCAPP & Dept. of Physics, Ohio State University
Radio Constraints on dark matter induced Galactic Center gamma-ray lines

4:20 PM - 4:40 PM **Alexander V Belikov**, Institut d'Astrophysique de Paris
Testing the composition of the of gamma rays from the galactic center and the cosmic ray electrons at TeV scale

4:45 PM - 5:05 PM **Mariangela Lisanti**, Princeton Center for Theoretical Science
Illuminating the 130 GeV Line with Continuum Photons

5:10 PM - 5:30 PM **Philip von Doetinchem**, UC Berkeley, Space Sciences Laboratory
The General Antiparticle Spectrometer (GAPS) - Hunt for dark matter using low energy antideuterons

Friday - July 27, 2012

PARTICLE PHYSICS/DIRECT DETECTION II
Convener: Joakim Edsjo
(Wolf Point Ballroom, 15th floor)

9:00 AM - 9:20 AM — **Chris Purcell**, University of Pittsburgh
Dark Matter Direct Search Rates in Simulations of the Milky Way and Sagittarius Stream

9:25 AM - 9:45 AM — **Richard Hill**, University of Chicago
Universal behavior in the scattering of heavy, weakly interacting dark matter on nuclear targets

9:50 AM - 10:10 AM — **Chung-Lin Shan**, Academia Sinica
Model-Independent Data Analysis in Direct Searches for Inelastic Dark Matter

10:15 AM - 10:35 AM — **Fabio Iocco**, Oskar Klein Center for CosmoParticle Physics
Dark Matter distribution in the Milky Way: microlensing and dynamical constraints

10:40 AM - 11:00 AM — **Bibhushan Shakya**, Cornell University
Direct Detection Implications on Supersymmetry Naturalness

11:05 AM - 11:25 AM — **Miguel Pato**, Technical University Munich
Combining direct detection and antiprotons to constrain dark matter models

STRUCTURE AND STARS
Convener: Carlos Frenk
(Steamboat room, 14th floor)

9:00 AM - 9:20 AM — **Andrew Zentner**, University of Pittsburgh
Asymmetric Dark Matter may Alter the Conditions for Stardom

9:25 AM - 9:45 AM — **Mei-Yu Wang**, University of Pittsburgh
Constraints on Decaying Dark Matter from Large-Scale Structure

9:50 AM - 10:10 AM — **Donghai Zhao**, Shanghai Astronomical Observatory
Tthe universal mass-concentration relation for cold, warm and hot dark matter halos

10:15 AM - 10:35 AM — **Matthew R Becker**, University of Chicago
Extreme Scale Weak Lensing Simulations for Large Area Sky Surveys

10:40 AM - 11:00 AM — **Andrey Kravtsov**, University of Chicago
Evolution of halo mass and cluster observable-mass scaling relations

INDIRECT DETECTION IV
Convener: Mariangela Lisanti
(Western Stage room, 14th floor)

9:00 AM - 9:20 AM — **Alessandro Cuoco**, Oskar Kein Center for CosmoParticle Physics
Diffuse Gamma-ray Background anisotropies and Dark Matter

9:25 AM - 9:45 AM — **German A. Gomez-Vargas**, Universidad Autonoma de Madrid / IFT UAM-CSIC / INFN Roma Tor Vergata
Dark matter constraints from the anisotropies of the gamma-ray background measured by the Fermi-LAT

9:50 AM - 10:10 AM — **Andrew W Smith**, University of Utah
The VERITAS Indirect Dark Matter Detection Program

10:15 AM - 10:35 AM — **David Tran**, University of Minnesota
Cosmic-ray and gamma-ray constraints on dark matter stability

Conference Presentations

1. **Kevork N. Abazajian**, University of California, Irvine
   Plenary Talk: ***Status of sterile neutrino dark matter***

   July 25, 2012 (12:00 PM - 12:25 PM)
   Plenary session

   Co-authors: Massimo Ricotti, Emil Polisensky, George M. Fuller, Manoj Kaplinghat
   I review the status of astrophysical and cosmological probes of sterile neutrino dark matter. Galaxy formation and cosmological small-scale structure has hinted at a potential cutoff in primordial perturbations at sub-dwarf galaxy scales, a possible indication for "warm" dark matter, for which sterile neutrinos are an ideal candidate. For certain parameter regimes, sterile neutrinos can also exhibit the properties of cold dark matter. Searches for sterile neutrino warm dark matter effects on cosmological small-scale structure have led to no signals in the linear regime, nor any signals in the X-ray through their decay. However, the sub-halo central density problem remains a persistent problem for pure cold dark matter galaxy formation.

2. **Katsushi Arisaka**, UCLA
   Talk: ***MAX and XAX: Dark matter and neutrino observatory based on multi-ton liquid xenon and liquid argon***

   July 25, 2012 (5:10 PM - 5:30 PM)
   Parallel session: Direct Detection III

   MAX (Multi-ton Argon Xenon) is the G3 dark matter detector, consisting of 10 tons of Xenon and 30-50 tons of Argon. It is a joint project by XENON and DarkSide collaboration. Such a combination of Xe and Ar allows determination of WIMP mass and cross section precisely. XAX (Xenon-Argon-Xenon) is even more ambitious project consisting of multi-ton 137Xe enriched Xe (for neutrino-less double beta decay) and depleted Xe (for pp-chain solar neutrino), together with a Argon detector. Scientific goals and technical challenges will be presented (arXiv:1107.1295).

3. **Zoltan Arvay**, SBC Cluster
Poster: ***Extended Einstein Rosen Bridge Quasars are Predicted***

July 23, 2012

Co-authors: V. ARVAY
We suppose that Dark Matter is an other Universe, so we identify Dark Matter as the other Universe. On the base of this we predict that Extended Einstein Rosen Bridges can develop between the Dark Matter Universum and the visible Universe. The Extended Einstein Rosen Bridges are realised by Schwarzhild Wormholes. The Bridge can be opened by the effect that in Dark Matter there are developed Aggregations of matter which opens bridges (Schwarzhild Wormholes). In Schwarzschild coordinates, the Schwarzschild metric has the form: Via these channels large intensity matter can come through as white source and form jet emission of matter into the Visible Universe. Such an object we can identify as Quasar. There is no time and energy constraint for such and effect, so it can happen already 1 billion year after Big Bang and can be extremely energetic, also it can carry definit momentum. During this process quasars populate with additional matter their galaxies. Also the jet axis is mainly responsible for disc shape of galaxies.This way Quasars decelerated the expansion of Universe. When white source Quasars stop activity the Quasar turns to be a massive central blackhole which by accreting the surrounding matter mainly from the generated galactic ring pushes back some matter through the Extended Einstein Rosen bridge to the Dark Matter Universe. This way supermassive central Balck Holes also accelerate the expansion. Through the lifecycle of quasars matter oscillates between Visible and Dark Matter universes. We have worked out a mathematical model for the extended wormhole which provide these effects. This is in case of a white source jet emitting Quasar +3D white hole mouth metrics connected in the throath with a +1- 1 dimensional gradient spacetime multifractal in the center coupled to the end mouth with a -3 D Hopf fibration. In case of an accreting Supermassive Central Black Hole +3D black hole mouth metrics connected in the throath with a +1- 1 dimensional gradient spacetime multifractal in the center coupled to the end mouth with a -3 D Hopf fibration. Einstein has found that the black holes contained a singularity at its centre; this is a point of infinite density. We can suppose that this yields at $D \sim 0$ that negative vacuum energy density resulting from the cosmological constant implies a positive pressure. The exotic dark matter at the $D < 0$ region [6] can have negative mass and positive surface pressure. The negative mass ensures that the throat of the wormhole lies outside the horizon, so that particles can pass through it, while the positive surface pressure prevents the wormhole from collapsing. References: [1] A. Einstein, N. Rosen , Physical Review 48, 73 (1935) [2] Z. Arvay at al., Z. Phys. A 348, 201-210 (1994) [3.] Z. Arvay and V. Arvay, Dimension Dynamics and the Double World, SBA Foundation Preprint, 2006 Dec. 8. [4] Z. Arvay, Dual World theory, Presentation at SISSA 2008 (Trieste, Italy) [5] Z. Arvay et al., Scaling and Dimension Dynamics, Preprint SBA Foundation, 2008 (Hungary) [6] Z. Arvay and V. Arvay, Acceleration of expansion and neutrino momentum relocation, Abstract, submitted to Dark Matter UCLA 2012 conference, 2012 [7] Z. Arvay and V. Arvay, Structures and oscillations between visible and dark matter in the framework of the Dual World Theory model, EuCost Brussels and SBC Cluster, Hungary, Abstract, submitted to Dark Matter UCLA 2012 conference, 2012

4. **Ritoban Basu Thakur**, Fermilab / UIUC
Talk: ***The CDMSlite experiment***

July 26, 2012 (4:45 PM - 5:05 PM)
Parallel session: Direct Detection IV

The SuperCDMS experiment will use new iZIP detectors to set competetive limits in the direct detection of Dark Matter, particularly in the 100 to 1000 GeV of WIMP mass. In the SuperCDMS framework we are also attempting a novel low threshold experiment to look for light WIMPs of mass around O(10GeV). We call this the CDMS low ionization threshold experiment or "CDMSlite". Here we use high bias voltage to amplify charge signal of low energy recoils, by increasing their Luke phonon emission. I will describe the physics behind CDMSlite and comment on our expected low threshold limits.

5. **Matthew R Becker**, University of Chicago
Talk: ***Extreme Scale Weak Lensing Simulations for Large Area Sky Surveys***

July 27, 2012 (10:15 AM - 10:35 AM)
Parallel session: Structure and Stars

Weak lensing measurements are an essential part of near- and long-term large-area sky surveys aimed at an array of scientific goals, like understanding Dark Energy, elucidating further the connection between galaxies and dark matter halos, constraining modifications to General Relativity, etc. The weak lensing community has undertaken extensive simulation efforts, both CCD image simulations and computations of the cosmological weak lensing signals from large-scale structure simulations, in order to address the variety of systematic errors which can adversely effect these measurements and their interpretation. The next logical step in this effort is the construction of mock galaxy catalogs with weak lensing shear signals self-consistently from large-scale structure simulations. While these weak lensing mock galaxy catalogs have easily been made for small patches of sky (~10 square degrees), upcoming large-area sky surveys will image thousands of square degrees or more. I will describe a new multiple-plane ray tracing code which is able to produce full-sky weak lensing deflection, convergence, and shear fields suitable for the construction of weak lensing mock galaxy catalogs for large-area sky surveys. I will also highlight the application of this code to the Dark Energy Survey simulation effort and to the study of systematics in weak lensing measurements.

6. **Alexander V Belikov**, Institut d'Astrophysique de Paris
Talk: ***Testing the composition of the of gamma rays from the galactic center and the cosmic ray electrons at TeV scale***

July 26, 2012 (4:20 PM - 4:40 PM)
Parallel session: Indirect Detection III

Co-authors: Gabrijela Zaharijas, Joe Silk
The spectrum of gamma rays from the galactic center (Fermi+HESS) as well as the spectrum of cosmic ray electrons (Fermi+HESS) both exhibit a cutoff at TeV energies. Such a cutoff can be naturally explained by the spectrum of annihilating dark matter in both cases. We update the previous constraints in the plane thermal cross-section vs. dark matter mass. We also study the best fits to the data in the parameter space defined by the branching ratio to a particular annihilation channel and the mass of dark matter particle. This is more robust than the boost factor to the uncertainties introduced by dark matter distribution and the propagation of charged particles.

7. **Lars Bergstrom**, Stockholm University
Talk: ***Spectral gamma-ray signatures in dark matter detection - a review***

July 24, 2012 (2:15 PM - 2:35 PM)
Parallel session: Indirect Detection II

8. **Nicolas Bernal**, University of Bonn, Germany
Talk: ***Phenomenology of WIMPy baryogenesis models***

July 25, 2012 (2:15 PM - 2:35 PM)
Parallel session: Particle Physics/Direct Detection I

Co-authors: Francois-Xavier Josse-Michaux and Lorenzo Ubaldi

9. **Gianfranco Bertone**, University of Amsterdam
Plenary Talk: ***Summary Talk***

July 27, 2012 (4:10 PM - 4:35 PM)
Plenary session

10. **Mark Boulay**, Queen's University
Talk: ***DEAP-3600 Dark Matter Search at SNOLAB***

July 24, 2012 (2:40 PM - 3:00 PM)
Parallel session: Direct Detection II

The DEAP-3600 experiment will search for dark matter particle interactions on liquid argon at SNOLAB, located 2 km underground in Sudbury, Ontario. The detector is currently under construction, and will contain a 3600 kg liquid argon target in an acrylic sphere surrounded by photomultiplier tubes for detection of scintillation light, with a target sensitivity to spin-independent scattering on nucleons of 10^{-46} cm^2. Significant background reduction studies, including pulse-shape discrimination of beta/gamma events, and studies of radon and surface contamination reduction have been carried out with a prototype liquid argon detector at SNOLAB. The status of the experiment and of background reduction studies will be presented.

11. **Daniel Brandt**, KIPAC, SLAC National Accelerator Lab, Stanford University
Talk: ***Understanding the Physics of SuperCDMS SNOLAB Detectors***

July 23, 2012 (2:15 PM - 2:35 PM)
Parallel session: Direct Detection I

Co-authors: H. Chagani, P. Brink, B. Cabrera, K. McCarthy, R. Resch, S. Leman, M. Asai
The SuperCDMS SNOlab experiment is a 2nd generation dark matter direct detection experiment proposed by the Cryogenic Dark Matter Search (CDMS) collaboration. This talk focuses on the design of 100mm diameter Ge crystal detectors which are planned for the SuperCDMS SNOLAB experiment with >100 kg of target mass. We discuss the fabrication of 100mm diameter test devices and present charge collection spectra recorded using several test sources. A detailed Monte Carlo simulation of these devices is presented and compared to experimental data, including detailed simulation of backgrounds, test sources and detector physics, taking into account anisotropic charge propagation within the crystal lattice. The simulation is shown to be in excellent agreement with the observed gamma charge spectra, correctly predicting the broadening of some spectral features and demonstrating a good understanding of the detector physics as well as the suitability of 100mm diameter Ge crystals for use as CDMS detectors.

12. **James Buckley**, Washington University
Plenary Talk: ***Dark matter searches with ACTs***

July 24, 2012 (11:35 AM - 12:00 PM)
Plenary session

13. **Ran Budnik**, Columbia university
Talk: ***The XENON1T experiment***

July 25, 2012 (2:15 PM - 2:35 PM)
Parallel session: Direct Detection III

Co-authors: E. Aprile
The Xenon Dark Matter direct detection project is entering its third phase, XENON1T. After successfully commissioning and taking data with the first stages of XENON10 and XENON100, we are designing and building a 1 tonne fiducial mass dual phase TPC Xenon detector, with a sensitivity goal of 2X10^-47 cm^2 (at 40 GeV) for SI WIMP interaction with nucleons - two orders of magnitude improvement from the current XENON100 limit. The improvement of two orders of magnitude in sensitivity requires an extremely low background, very high chemical purity and the usage of high voltage components that have not been used in Xe before. In this talk, I will describe the challenges, the design and the ongoing related R&D of the XENON1T experiment.

14. **Carmen Carmona-Benitez**, Case Western Reserve University
Talk: ***LUX detector, Installation and Operation***

July 25, 2012 (2:40 PM - 3:00 PM)
Parallel session: Direct Detection III

Co-authors: The LUX Collaboration
The Large Underground Xenon (LUX) experiment will operate a 300 kg xenon TPC, intended to directly detect the elastic scattering of WIMPs. LUX is designed to be sensitive to a WIMP scattering cross section of 7x10^{-46} cm^2 for a WIMP mass of 100 GeV. It will surpass all existing dark matter limits for WIMPs with mass above 10 GeV within weeks after beginning its science run. LUX recently finished the last run in the Sanford Surface Laboratory at Homestake, where all the systems were extensively tested and characterized in their final configuration, and is currently being deployed underground. This milestone marks the first successful use of technologies proposed for tonne-scale detectors, such as water shielding and thermosyphon cryogenics. In this talk, we present the experiment and summarize the surface commissioning phase, with a focus on the subsystems that make LUX a major competitor in the field of dark matter detection.

15. **Riccardo Cerulli**, INFN-LNGS
Plenary Talk: ***Dark matter signal in DAMA/LIBRA***

July 24, 2012 (9:00 AM - 9:25 AM)
Plenary session

The DAMA/LIBRA set-up (about 250 kg of highly radiopure NaI(Tl)) is in data taking at the Gran Sasso National Laboratory of the I.N.F.N. The results obtained over 6 annual cycles have been already published; the cumulative exposure, considering also the data collected with the former DAMA/NaI, is 1.17 ton $times$ yr corresponding to 13 annual cycles. The data give a 8.9 $sigma$ C.L. model independent evidence for the presence of Dark Matter (DM) particle in the Galactic halo on the basis of the exploited DM annual modulation signature. No systematics or side reaction able to mimic the observed effect (that is, able to account for the (2-6) keV single-hit events annual modulation amplitude and simultaneously satisfy all the many peculiarities of the signature) is available or suggested by anyone over more than a decade. The data of a further annual cycle, collected before the new upgrading performed in the end of 2010 when all the PMTs have been replaced with new ones having higher quantum efficiency, are available. At present DAMA/LIBRA is running in the new configuration. Results, implications and perspectives will be addressed.

16. **Hassan Chagani**, University of Minnesota
Talk: ***SuperCDMS-SNOLAB: Road to 100 mm Germanium Detectors***

July 23, 2012 (2:40 PM - 3:00 PM)
Parallel session: Direct Detection I

Co-authors: D. A. Bauer, D. Brandt, P. L. Brink, B. Cabrera, M. Cherry, E. Do Couto e Silva, G. G. Godfrey, J. Hall, S. Hansen, J. Hasi, M. Kelsey, C. J. Kenney, V. Mandic, D. Nagasawa, L. Novak, N. Mirabolfathi, R. Partridge, R. Radpour, R. Resch, B. Sadoulet, D. N. Seitz, B. Shank, A. Tomada, J. Yen, B. A. Young and J. Zhang
The Super Cryogenic Dark Matter Search (SuperCDMS) SNOLAB experiment will consist of an array of germanium crystals of total mass 100 kg. Such a large detector payload poses significant technical and cost challenges that can be alleviated through the development of larger crystals. Two prototype detector-grade germanium crystals of diameter 100 mm and thickness 33.3 mm have been designed, which are 2.3 times larger than those currently commissioned as part of SuperCDMS Soudan. The first crystal features 4 electrodes patterned as concentric rings on one side of the detector. The second is double-sided, with two electrodes on each side interleaved by grounded strips in a spiral configuration. Results, including charge collection efficiency and stability, from cryogenic detector characterisation tests of these crystals are presented here. Furthermore, the status of the first 100 mm diameter germanium detector featuring both phonon and charge channels is discussed.

17. **Ilias Cholis**, SISSA (Scuola Internazionale Superiore di Studi Avanzati)
Talk: ***Extracting limits on dark matter annihilation from dwarf spheroidal galaxies***

July 26, 2012 (2:40 PM - 3:00 PM)
Parallel session: Indirect Detection III

Co-authors: Paolo Salucci
Dwarf spheroidal galaxies compose one of the most dark matter dominated classes of objects, making them a set of targets to search for signals of dark matter annihilation. The recent developments in gamma-ray astronomy, most importantly the launch of the Fermi-LAT instrument, have brought those targets into attention. Yet, no clear excess of gamma-rays has been confirmed, resulting in some of the tightest limits on dark matter annihilation from indirect searches. In extracting such limits from dwarf spheroidal galaxies, the uncertainties in the dark matter distribution properties of the dwarf spheroidal galaxies, and uncertainties on the underlying background are of great importance. I will discuss the limits on dark matter annihilation, from gamma-rays studying a set of close-by dwarf spheroidal galaxies, for which, there is good understanding of the uncertainties in the dark matter distribution. For those targets, I will present results from alternative methods in extracting the background gamma-ray flux, providing a method to discriminate among the dark matter annihilation targets, those that can give robust constraints. Finally I will present the tightest (conservative) limits on dark matter annihilation, coming only from the targets that ensure accurate understanding of both the gamma-ray background and the dark matter distribution uncertainties.

18. **Aaron S Chou**, Fermilab
Plenary Talk: ***The Hunt for axions***

July 23, 2012 (11:25 AM - 11:50 AM)
Plenary session

Experimental overview of axion physics.

19. **Juan Collar**, Kavli Institute for Cosmological Physics
Plenary Talk: ***New results from CoGeNT***

July 24, 2012 (9:50 AM - 10:15 AM)
Plenary session

20. **Randy C Cotta**, SLAC/Stanford
Talk: ***Experimental Bounds on Chi-Chi-V-V***

July 24, 2012 (3:55 PM - 4:15 PM)
Parallel session: Particle Physics

Co-authors: Joanne Hewett, Tom Rizzo, My Phuong Le
We describe bounds on a variety of possible dark matter interactions with electroweak vector bosons (A, W and Z) in an effective operator framework. Collider constraints are derived from weak boson fusion searches at the LHC in a manner similar to invisible Higgs analyses. We compare the constraining power of the LHC with astrophysical constraints that are derived from a variety of data, primarily via indirect detection measurements of cosmic-ray antiprotons and gamma-rays.

21. **Michael B. Crisler**, Fermilab
Talk: ***Dark Matter Search Results from the COUPP-4kg Bubble Chamber at SNOLAB***

July 26, 2012 (2:15 PM - 2:35 PM)
Parallel session: Direct Detection IV

New data are reported from the operation of a 4.0 kg CF3I bubble chamber in the 6800 foot deep SNOLAB underground laboratory. The effectiveness of ultrasound analysis in discriminating alpha decay background events from single nuclear recoils has been confirmed, with a lower bound of > 99.3% rejection of alpha decay events. Twenty single nuclear recoil event candidates and three multiple bubble events were observed during a exposure of 553 kg-day distributed over three different bubble nucleation thresholds. A neutron background internal to the apparatus, of known origin, is estimated to account for five single nuclear recoil events and is consistent with the observed rate of multiple bubble events. This observation provides world best direct detection constraints on WIMP-proton spin-dependent scattering for WIMP masses > 20 GeV/c2, and demonstrates significant sensitivity for spin-independent interactions.

22. **Alessandro Cuoco**, Oskar Kein Center for CosmoParticle Physics
Talk: ***Diffuse Gamma-ray Background anisotropies and Dark Matter***

July 27, 2012 (9:00 AM - 9:20 AM)
Parallel session: Indirect Detection IV

Co-authors: Eiichiro Komatsu, Jennifer Siegal-Gaskins
The diffuse gamma-ray background is expected to exhibit small scale anisotropies which can carry information on the underlying sources contributing to it. Astrophysical sources as well as more exotic processes like galactic or extragalactic DM annihilation are expected to leave their imprint in the pattern of the gamma-ray anisotropies. I will present the results of an angular power spectrum analysis of the high-latitude diffuse emission measured by the Fermi-LAT, and discuss the implications of the measured angular power spectrum for gamma-ray source populations that may provide a contribution to the diffuse background.

23. **Priscilla B Cushman**, University of Minnesota
Plenary Talk: ***SuperCDMS: Progress and Future Directions***

July 23, 2012 (9:10 AM - 9:35 AM)
Plenary session

Co-authors: for the SuperCDMS Collaboration

24. **Jordan Damgov**, Texas Tech University
Talk: ***Recent results from a search for Dark Matter production in the CMS experiment***

July 24, 2012 (2:15 PM - 2:35 PM)
Parallel session: Particle Physics

Results are presented from a search for new physics in final states containing a photon or jet and an imbalance in transverse momentum in 5 fb^{-1} of integrated proton-proton luminosity at sqrt{s}=7 TeV collected by the Compact Muon Solenoid experiment at the Large Hadron Collider. The number of observed events is consistent with that expected from the standard model background, and so the result is interpreted as limits on dark matter models.

25. **Matthias Danninger**, Stockholm University
Talk: ***Search for Dark Matter Captured in the Sun with the IceCube Neutrino Observatory***

July 23, 2012 (2:15 PM - 2:35 PM)
Parallel session: Indirect Detection I

Co-authors: The IceCube Collaboration
In many models, dark matter gravitationally concentrated at the center of the Sun can self-annihilate and produce standard model particles, including neutrinos. Large scale neutrino telescopes, such as the one cubic kilometer IceCube Neutrino Observatory, located at the South Pole, can be used to search for a high-energy neutrino flux from the Sun. In this way dark matter properties can be indirectly probed. We report on the results for a search for dark matter annihilations in the Sun with the IceCube neutrino detector in the 79-string configuration, which includes for the first time the densely instrumented DeepCore subarray. DeepCore has been optimized for efficient detection of low energy neutrino-induced muons and cascades, and extends the sensitivity of IceCube to ~10-20 GeV energies, a promising region for dark matter candidates. In addition, DeepCore offers the possibility to extend searches to the southern sky, effectively doubling the livetime of solar dark matter searches.

26. **Basudeb Dasgupta**, CCAPP, Ohio State University
Talk: ***Probing DM in Galaxy Clusters using Neutrino Telescopes***

July 23, 2012 (3:55 PM - 4:15 PM)
Parallel session: Indirect Detection I

Co-authors: Ranjan Laha
Substantial enhancement due to DM substructures in galaxy clusters allows neutrino telescopes to probe DM annihilation to several interesting channels. Based on our results in arXiv:1206.1322, we discuss how to optimize this search at present and future experiments.

27. **Joakim Edsjo**, Oskar Klein Centre / Stockholm University
Talk: ***Neutrino searches for dark matter***

July 23, 2012 (3:05 PM - 3:25 PM)
Parallel session: Indirect Detection I

Searches for dark matter via neutrinos is an ongoing effort and I will here go through the current impact of neutrino searches on dark matter models and some of theoretical uncertainties that go into the prediction of neutrino fluxes from dark matter.

28. **Klaus Eitel**, Karlsruhe Institute of Technology
Plenary Talk: ***The EDELWEISS dark matter search***

July 23, 2012 (10:00 AM - 10:25 AM)
Plenary session

Co-authors: for the EDELWEISS collaboration
We will review the results from EDELWEISS-II and present the status and perspectives for the next phase, EDELWEISS-III

29. **Juan Estrada**, Fermilab
Talk: ***Direct Dark Matter Search with Charge Couple Devices***

July 26, 2012 (4:20 PM - 4:40 PM)
Parallel session: Direct Detection IV

Co-authors: The DAMIC Collaboration
Due to their very low electronic readout noise, CCDs present a new opportunity for low threshold dark matter searches. We will present the current status of the R&D towards a Dark Matter search with CCDs and the future plans for deploying this technology.

30. **Carlos H Faham**, Brown University
Talk: ***Alpha tomography, calibrations and backgrounds in the LUX dark matter experiment***

July 25, 2012 (3:05 PM - 3:25 PM)
Parallel session: Direct Detection III

Co-authors: LUX Collaboration
The LUX detector is a 350 kg two-phase liquid xenon detector that aims to directly detect dark matter in the form of Weakly Interacting Massive Particles (WIMPs) a mile underground at the Sanford Underground Research Facility. The detector just completed a full-assembly liquid xenon data run at a surface facility, and is now being commissioned at the underground laboratory. During the surface data run, Rn-222 (an alpha emitter) was injected into the detector as an imaging source for our circulation system, and the resulting tomography was helpful in diagnosing an opening in the circulation path. The alpha signatures were also used for detector calibrations, and for electron lifetime measurements. The Rn chain will eventually decay into Pb-210, a 22 year half-life isotope that will, through a few more decay steps, produce alpha particles. Alpha particles can produce (alpha,n) reactions in the detector (particularly in fluorinated compounds, such as PTFE), and these neutrons can pose a significant background for dark matter detection. We will show measurements of Pb-210 residual contamination in the detector, which is subdominant to the estimated neutron yield from the photomultiplier tubes.

31. **Nicole E Fields**, University of Chicago
Talk: ***A low-energy analysis of CDMS data***

July 23, 2012 (3:30 PM - 3:50 PM)
Parallel session: Direct Detection I

Co-authors: Juan Collar

32. **Douglas P Finkbeiner**, Harvard University
Plenary Talk: ***Fermi jets and the 130 GeV line***

July 27, 2012 (2:00 PM - 2:25 PM)
Plenary session

Co-authors: Meng Su
Complexity of the gamma-ray emission in the inner Milky Way hinders indirect detection of dark matter annihilation there, but may not prevent it. I will discuss substructure in the Fermi bubbles (e.g. gamma-ray jets, see arXiv:1205.5852) in light of claims of a 130 GeV bump (by Weniger and others). Provocative statements about the morphology of the 130 GeV emission will follow, along with evidence that it is not associated with the bubbles.

33. **Carlos S Frenk**, Durham University
Plenary Talk: ***Status of dark matter simulations***

July 25, 2012 (9:00 AM - 9:25 AM)
Plenary session

34. **Alex Geringer-Sameth**, Brown University
Talk: ***Results of continuum and line WIMP searches in dwarf galaxies with Fermi***

July 26, 2012 (2:15 PM - 2:35 PM)
Parallel session: Indirect Detection III

Co-authors: Savvas M. Koushiappas
We will present new results from a search for both continuum and line emission from WIMP annihilation in Milky Way dwarfs. These results are based on the joint analysis of dwarf galaxy data from the Fermi Gamma-ray Space Telescope using a statistically optimal weighting of photons including both spatial and spectral information. This indirect detection search is strong enough to probe generic WIMP candidates that reproduce the relic abundance.

35. **Karen Gibson**, Case Western Reserve University
Plenary Talk: ***The LUX Experiment***

July 26, 2012 (10:45 AM - 11:10 AM)
Plenary session

Co-authors: on behalf of the LUX collaboration
I will present the status and prospects of the LUX experiment, which employs 350 kg of two-phase xenon to search for cold dark matter interactions. The LUX detector was commissioned at the surface laboratory of the Sanford Underground Research Facility in Lead, SD, during the winter of 2012 and is scheduled to begin its underground dark matter search in the autumn of 2012. I will review the results from the commissioning as well as expectations for underground data-taking.

36. **German A. Gomez-Vargas**, Universidad Autonoma de Madrid / IFT UAM-CSIC / INFN Roma Tor Vergata
Talk: ***Dark matter constraints from the anisotropies of the gamma-ray background measured by the Fermi-LAT***

July 27, 2012 (9:25 AM - 9:45 AM)
Parallel session: Indirect Detection IV

Co-authors: On behalf of the Fermi LAT collaboration, Alessandro Cuoco, Mattia Fornasa, Luca Latronico, Tim Linden, Aldo Morselli, Francisco Prada, Miguel A. Sanchez-Conde, Jennifer M. Siegal-Gaskins, Fabio Zandanel,Jesus Zavala
The detailed origin of the diffuse gamma-ray background is still unknown. However, the contribution of unresolved sources is expected to induce small-scale anisotropies in this emission, which may provide a means of identifying and constraining the properties of its contributors. Recent studies have predicted the contributions to the angular power spectrum (APS) from extragalactic and galactic dark matter (DM) annihilation or decay. We use predictions from state-of-the-art numerical DM simulations for the DM anisotropy and compare with a measurement of the APS from the Fermi-LAT to derive constraints on generic DM candidates.

37. **Paolo Gondolo**, University of Utah
Talk: ***Phenomenology of light WIMPs***

July 25, 2012 (2:40 PM - 3:00 PM)
Parallel session: Particle Physics/Direct Detection I

I will present an overview of the phenomenology of low mass WIMPs, with particular focus on direct detection.

38. **Andreas Goudelis**, DESY - Hamburg
Talk: ***The Inert Doublet Model of Dark Matter Beyond Tree-level***

July 25, 2012 (3:05 PM - 3:25 PM)
Parallel session: Particle Physics/Direct Detection I

39. **Shawn W Henderson**, Massachusetts Institute of Technology
Talk: ***Surface Commissioning of the DMTPC 4-Shooter Directional Dark Matter Detector Prototype***

July 24, 2012 (4:45 PM - 5:05 PM)
Parallel session: Direct Detection II

Co-authors: for the DMTPC collaboration
Directional detection could provide an unambiguous observation of dark matter due to the predicted directional anisotropy of dark matter particles in galactic coordinates. The Dark Matter Time Projection Chamber (DMTPC) collaboration is developing TPCs with optical readout whose goal is the detection of the sense and direction of elastic recoils generated by dark matter interactions with fluorine atoms in low pressure CF_4 gas, from which the direction of the incident dark matter particle can be inferred. The TPC is built around a mesh based amplification region that allows for 2D imaging of nuclear recoil tracks in the CCD camera plane. Reconstructing the third coordinate of recoils has been a subject of intensive R&D over the past several years, culminating in the design and construction of a next generation detector, the "4-shooter." The third coordinate of recoils is reconstructed in this detector using PMTs and the timing of induced charge signals in the detector amplification region. Surface characterization of the 4-shooter detector is currently underway. Its performance is being studied using alpha particles, low energy neutrons, and x rays. This talk will report on the surface commissioning data. After surface running, this detector will be deployed in the DMTPC underground laboratory at the Waste Isolation Pilot Plant facility in New Mexico. The 4-shooter is prototyping several new detector techniques for a larger (1m^3) detector.

40. **Scott A Hertel**, MIT
Talk: ***Search for Annual Modulation in Low-Energy CDMS-II Data***

July 23, 2012 (3:55 PM - 4:15 PM)
Parallel session: Direct Detection I

Co-authors: The CDMS Collaboration
We report limits on annual modulation of the low-energy event rate from the Cryogenic Dark Matter Search (CDMS II) experiment. Such a modulation could be produced by interactions from WIMPs with masses of âˆ¼10 GeV/c^2. We find no evidence for annual modulation of events consistent with WIMP nuclear recoils, and in the 5-11.9 keVnr energy range we constrain the magnitude of this modulation to

41. **Richard Hill**, University of Chicago
Talk: ***Universal behavior in the scattering of heavy, weakly interacting dark matter on nuclear targets***

July 27, 2012 (9:25 AM - 9:45 AM)
Parallel session: Particle Physics/Direct Detection II

Co-authors: Mikhail P. Solon
We introduce heavy particle effective field theory techniques to isolate universal properties and to systematically study the QCD anatomy of dark matter direct detection. Particles that are heavy compared to the electroweak scale ($M gg m_W$), and that are charged under electroweak SU(2) gauge interactions display universal properties such as a characteristic fine structure in the mass spectrum induced by electroweak symmetry breaking, and an approximately universal cross section for scattering on nuclear targets. The heavy particle effective theory framework is developed to compute these properties. As illustration, the spin independent cross section for low-velocity scattering on a nucleon is evaluated in the limit $M gg m_W$, including complete leading-order matching onto quark and gluon operators, renormalization analysis, and systematic treatment of perturbative and hadronic-input uncertainties. Journal reference, R.J. Hill and M.P. Solon, Phys.Lett. B707 (2012) 539-545

42. **Andrew Hime**, Los Alamos National Laboratory
Plenary Talk: ***CLEAN Detection of Dark Matter***

July 26, 2012 (11:35 AM - 12:00 PM)
Plenary session

43. **Akira Hitachi**, Kochi Medical School
Talk: ***The electronic LET for slow ions in dark matter detector media***

July 24, 2012 (3:05 PM - 3:25 PM)
Parallel session: Direct Detection II

The information on the electronic LET (linear energy transfer), the specific electronic energy loss along the charged particle track, is an important factor to consider the scintillation efficiency, ionization yield, as well as the head-tail detection in detectors for direct WIMP searches. The scintillation is an electronic process. Most of scintillation quenching theories, including Birks theory, relay on the information of the spatial distribution of excited species (ions and excited states). The electronic energy deposition is not given by -dE/dx when the nuclear stopping cannot be ignored; electronic LET (LETel = -d(eta)/dx), where eta is the electronic energy deposited, should be used. When LETel is obtained, the knowledge accumulated over many years in radiation physics and chemistry can be used to evaluate scintillation quenching as well as ionization yield. The eta value for single-element media is given by Lindhard. However, no such expressions in compounds are available. A model which has been applied for recoil ions in binary gases may be discussed. In the present talk, the electronic LET for recoil ions, and Pb recoils in alpha decay are evaluated and the track structures are compared with those for low energy electrons and alpha particles in relation to scintillation yields, decay shapes in high pressure gases and in condensed media.

44. **Fabio Iocco**, Oskar Klein Center for CosmoParticle Physics
Talk: ***Dark Matter distribution in the Milky Way: microlensing and dynamical constraints***

July 27, 2012 (10:15 AM - 10:35 AM)
Parallel session: Particle Physics/Direct Detection II

Co-authors: Miguel Pato, Gianfranco Bertone, Philippe Jetzer
The combined use of microlensing observations (sensible only to the matter in the form of compact objects) and of the rotation curves of our Galaxy (sensible to all the matter contect), permit to place interesting constraints on the Dark Matter distribution in our Galaxy, and in particular on the Dark Matter density at the Sun's location. In this talk I will highlight the advantages of such technique, and its future developments.

45. **Joerg Jaeckel**, IPPP/Durham University
Plenary Talk: ***Axions, WISPs and other stuff***

July 23, 2012 (11:00 AM - 11:25 AM)
Plenary session

46. **Alexander A. Kirillov**, National Research Nuclear University "MEPhI"
Talk: ***Small scale dark matter clumps and its gamma ray signals***

July 26, 2012 (3:05 PM - 3:25 PM)
Parallel session: Indirect Detection III

Co-authors: Konstantin M. Belotsky, Maxim Yu. Khlopov, Veronika Yu. Shalamova
The possibility of identification of point-like gamma-ray sources (PGRS) with dark matter (DM) clumps in our Galaxy is discussed. Gamma-rays are supposed to originate from annihilation of DM particles in the clumps, which rate is enhanced due to higher density and possibly due to smaller relative velocities v of DM particles in the clump. The parameterized form of annihilation cross section is used which allows arbitrary power dependence from v and a possible new Coulomb-like interaction. Adopting different density profiles of DM in the clumps, the values of the cross section parameters (and its implications for specific DM candidates) are constrained from comparison with Fermi/LAT data on unidentified PGRS as well as from condition Omega

47. **Manungu Kiveni**, Syracuse University
Talk: ***Reanalysis of CDMS II data***

July 23, 2012 (3:05 PM - 3:25 PM)
Parallel session: Direct Detection I

Co-authors: CDMS collaboration
The Cryogenic Dark Matter Search (CDMS) experiment is designed to detect Weakly Interacting Massive Particles (WIMPs) using athemral-phonon-mediated Ge and Si crystal detectors. Between July 2007 and September 2008 ~612 kg-days of Ge exposure was collected during a WIMP search at the Soudan Underground Laboratory. Two candidate events were identified, resulting in world leading sensitivity to WIMPs with masses greater than ~40 GeV/c^2. The CDMS II Ge and Si data have been reprocessed with improved algorithms in an attempt to increase WIMP detection efficiency without increasing the background expectation. This paper reports progress on these new and more sophisticated analysis techniques.

48. **Joachim Kopp**, Fermilab
Plenary Talk: ***Direct detection of light WIMPs***

July 24, 2012 (10:45 AM - 11:10 AM)
Plenary session

If dark matter is lighter than about 10 GeV, its direct detection is especially challenging. After providing theoretical motivation for low-mass WIMPs, we present global constraints on the light WIMP scenario, and we outline strategies for future searches.

49. **Andrei Kounine**, Massachusetts Institute of Technology
Plenary Talk: ***Status of AMS-02***

July 27, 2012 (2:25 PM - 2:50 PM)
Plenary session

Alpha Magnetic Spectrometer (AMS-02) is a general purpose high energy particle detector which was successfully deployed on the International Space Station on May 19, 2011. It conducts a unique long duration mission of fundamental physics research in space. To date the detector collected over 18 billion cosmic ray events. Among the physics objectives of AMS are a search for understanding of Dark Matter, Antimatter, the origin of cosmic rays and the exploration of new physics phenomena not possible to study with ground based experiments. This report overviews operations and performance of the AMS-02 detector on ISS as well as the first results based on data collected during one year of operations in space.

50. **Jonathan Kozaczuk**, UC Santa Cruz
Talk: ***Exploring the Dark Matter - Electroweak Baryogenesis Connection in Supersymmetry***

July 25, 2012 (3:30 PM - 3:50 PM)
Parallel session: Particle Physics/Direct Detection I

Co-authors: Stefano Profumo, Carroll Wainwright
Supersymmetry generally predicts a viable dark matter candidate, the lightest supersymmetic particle (LSP), across large regions of parameter space as a result of R-parity. If the LSP is the lightest neutralino, enforcing the correct relic density, as well as conformity with current bounds from dark matter searches, constrains the neutralino mass and gaugino- and higgsino-mixing fractions. This in turn has implications for electroweak baryogenesis, since in many models the baryon asymmetry is sourced by CP-violation in the gaugino-higgsino sector. In this talk I will discuss the impact of current and future dark matter constraints on models of supersymmetric electroweak baryogenesis. As a concrete application, I will explore the possibility of embedding both dark matter and successful supersymmetric electroweak baryogenesis in Randall-Sundrum-type models of warped extra dimensions.

51. **Hans Kraus**, University of Oxford
Talk: ***EURECA***

July 23, 2012 (5:35 PM - 5:55 PM)
Parallel session: Direct Detection I

Co-authors: the EURECA collaboration
EURECA (European Underground Rare Event Calorimeter Array) is the European tonne-scale, cryogenic dark matter search, based on the cryogenic detector technology developed and demonstrated within EDELWEISS, CRESST and ROSEBUD. The aim is to explore scalar cross sections down to the 10E-10 pico-barn region. A major advantage of EURECA is its modularity and flexibility to hold different dark matter targets, aiding WIMP identification. We report on the current status of the design of the experiment, ongoing prospective work and future prospects of EURECA.

52. **Carsten B Krauss**, University of Alberta
Plenary Talk: ***Constraints on low-mass WIMPs from PICASSO***

July 25, 2012 (10:45 AM - 11:10 AM)
Plenary session

Co-authors: Viktor F Zacek (Universite de Montreal)
PICASSO at SNOLAB focuses mainly on spin-dependent WIMP interactions on 19-F using the superheated droplet technique. This technique is based on the bubble chamber principle, where phase transitions in superheated liquids can be triggered by WIMP induced nuclear recoils. The physics of the detection process allows a highly efficient suppression of backgrounds from cosmic muons, gamma- and beta-rays. In this talk we will discuss recent results of PICASSO in the 10 GeV low mass region in the spin-dependent, as well as in the spin-independent sector. We will also discuss future, larger scale applications of this technique at the scale of 100 kg and more.

53. **Andrey Kravtsov**, University of Chicago
Talk: ***Evolution of halo mass and cluster observable-mass scaling relations***

July 27, 2012 (10:40 AM - 11:00 AM)
Parallel session: Structure and Stars

Co-authors: Benedikt Diemer, Surhud More
I will present a new model for expected baseline evolution of halo mass and relation between observables such as galaxy mass or cluster X-ray properties and the total mass of parent halo. The results show that a significant fraction of the apparent evolution is expected to be due to particular mass definition, rather than due to actual physical evolution of potential and halo mass.

54. **Vitaly Kudryavtsev**, University of Sheffield
Talk: ***Background studies for the EDELWEISS dark matter experiment***

July 23, 2012 (4:20 PM - 4:40 PM)
Parallel session: Direct Detection I

Co-authors: The EDELWEISS Collaboration
The EDELWEISS-II collaboration has completed a direct search for WIMP dark matter using 400 g cryogenic Ge detectors and 384 kg x days of effective exposure. The next phase, EDELWEISS-III aims to probe the range of spin-independent WIMP-nucleon cross-sections below 10^(-8) pb. We present here the study of gamma and neutron background coming from radioactive decays in the set-up and shielding materials. We have carried out Monte Carlo simulations for the completed EDELWEISS-II setup with GEANT4 and normalised the expected background rates to the measured radioactivity levels of all materials and components. We have then extended the simulation framework to the EDELWEISS-III configuration with 800 g crystals, better material purity and additional neutron shielding inside the cryostat. We report the results of simulations for the two setups in comparison with experimental data where possible. The results of the background studies performed in the present work have helped to select better purity components and improve shielding in EDELWEISS-III to further reduce the expected rate of background events in the next phase of the experiment.

55. **Michael Kuhlen**, Theoretical Astrophysics Center, UC Berkeley
Plenary Talk: ***Status of dark matter simulations***

July 25, 2012 (9:25 AM - 9:50 AM)
Plenary session

56. **Ranjan Laha**, CCAPP & Dept. of Physics, Ohio State University
Talk: ***Radio Constraints on dark matter induced Galactic Center gamma-ray lines***

July 26, 2012 (3:55 PM - 4:15 PM)
Parallel session: Indirect Detection III

Co-authors: Basudeb Dasgupta, Shunsaku Horiuchi & Chun Yu Ng
I will talk about radio constraints on dark matter lines. In particular, I will show how better radio measurements near the Galactic Center can be useful to distinguish between different dark matter annihilation channels, for eg., dark matter annihilating to gamma gamma and Z gamma/ h gamma.

57. **Steven K Linden**, Boston University
Talk: ***Status Report on the MiniCLEAN Experiment***

July 24, 2012 (5:35 PM - 5:55 PM)
Parallel session: Direct Detection II

I will present a status report on the MiniCLEAN experiment, a single phase liquid argon detector designed to search for WIMPs via nuclear recoils. The detector, assembly of which will begin in 2013, will have a 500 kg (150 kg) target (fiducial) mass and will be instrumented with photomultiplier tubes. Pulse-shape discrimination will be used to reject the large Ar-39 radioactive background. In the event that a WIMP-like signal is observed, target substitution (liquid neon) and an enhanced Ar39 run will be used to check the veracity of the signal.

58. **Timothy Linden**, UC - Santa Cruz
Talk: ***Indirect Detection of Dark Matter at the Galactic Center***

July 24, 2012 (2:40 PM - 3:00 PM)
Parallel session: Indirect Detection II

Co-authors: Stefano Profumo, Dan Hooper, Elizabeth Lovegrove
The center of the Milky Way galaxy stands as one of the most compelling regions in which to search for indirect signals from dark matter annihilation, due to the expectation from models of galaxy formation that the region nearest the dynamical center of the galaxy should contain the highest density of dark matter particles. However, the galactic center also plays host to myriad astrophysical phenomena, which while interesting in their own right, play the role of obscuring a dark matter signal. We investigate the multiwavelength signals from the galactic center region, and use the morphology of both astrophysical and dark matter emission templates in order to constrain the origin of the dark matter signal. We especially investigate the possible observation of a light, leptophilic dark matter candidate in the galactic center region. Finally, we comment on the ability for future instruments to play a critical role in determining the origin of galactic center emission.

59. **Hugh Lippincott**, Fermilab
Talk: ***COUPP Iodine Recoil Threshold Experiment***

July 26, 2012 (2:40 PM - 3:00 PM)
Parallel session: Direct Detection IV

I will discuss results from a two week run of a small bubble chamber in the Fermilab Test Beam Facility in March of 2012. The purpose of the experiment was to calibrate the threshold for bubble nucleation induced by iodine recoils in superheated CF3I. A silicon pixel telescope provided by the facility was used to track 12 GeV pions as they interacted with nuclei in the bubble chamber. By matching pion tracks with the bubbles they produced, we measure the energy required to nucleate a bubble using simple kinematics.

60. **Mariangela Lisanti**, Princeton Center for Theoretical Science
Talk: ***Illuminating the 130 GeV Line with Continuum Photons***

July 26, 2012 (4:45 PM - 5:05 PM)
Parallel session: Indirect Detection III

Co-authors: Michael Kuhlen, David Spergel
Tidal stripping of dark matter from subhalos falling into the Milky Way produces narrow, cold tidal streams as well as more spatially extended 'debris flows' in the form of shells, sheets, and plumes. Here we focus on the debris ow in the Via Lactea II simulation, and show that this incompletely phase-mixed material exhibits distinctive high-velocity behavior. Unlike tidal streams, which may not necessarily intersect the Earth's location, debris flow is spatially uniform at 8 kpc and thus guaranteed to be present in the dark matter flux incident on direct detection experiments. At Earth-frame velocities greater than 450 km/s, debris flow comprises more than half of the dark matter at the Sun's location, and up to 80% at even higher velocities. Therefore, debris flow is most important for experiments that are particularly sensitive to the high velocity tail of the dark matter distribution, such as searches for light or inelastic dark matter or experiments with directional sensitivity. We show that debris flow yields a distinctive recoil energy spectrum and a broadening of the distribution of incidence direction.

61. **Zuowei Liu**, McGill University
Talk: ***Millicharged Atomic Dark Matter***

July 25, 2012 (5:10 PM - 5:30 PM)
Parallel session: Particle Physics/Direct Detection I

Co-authors: James Cline, Wei Xue
We present a simplified version of the atomic dark matter scenario, in which charged dark constituents are bound into atoms analogous to hydrogen by a massless hidden sector U(1) gauge interaction. We consider the case where the massless gauge boson kinetically mixes with the standard model hypercharge and thereby mediates direct detection. This is therefore the simplest atomic dark matter model that has direct interactions with the standard model, arising from the small electric charge for the dark constituents induced by the kinetic mixing. We map out the parameter space that is consistent with cosmological constraints and direct searches. In the special case where the dark "electron" and "proton" are degenerate in mass, inelastic hyperfine transitions can explain the CoGeNT excess events. In the more general case, elastic transitions dominate, and can be close to current direct detection limits over a wide range of masses.

62. **Dinesh Loomba**, University of New Mexico
Talk: ***The DRIFT Dark Matter Search***

July 24, 2012 (3:30 PM - 3:50 PM)
Parallel session: Direct Detection II

Co-authors: The DRIFT collaboration
The Directional Recoil Identification From Tracks (DRIFT) detector is a 1 m^3 scale negative ion TPC operating in the Boulby Mine in England. We will review recent published limits on spin-dependent WIMPs, which were constrained by a background of low-energy nuclear recoil events from decays of radon progeny at the detector's wire central cathode. Replacing the wire cathode with a new thin-film central cathode has drastically reduced this background. We will show evidence for this and describe additional techniques that are expected to nearly eliminate this background. A new DRIFT-II detector being constructed will demonstrate these background reduction ideas and show engineering feasibility towards scale up of a new DRIFT-III detector. Plans for this scaled up detector will be presented.

63. **David Malling**, Brown University
Talk: ***Background Characterization and Rejection in the LZ Detector***

July 25, 2012 (4:45 PM - 5:05 PM)
Parallel session: Direct Detection III

The LUX-ZEPLIN (LZ) experiment will use a 7 tonne liquid xenon time-projection chamber (TPC) as an active target in the search for WIMP interactions, allowing a WIMP sensitivity three orders of magnitude lower than current limits. I will discuss detailed studies characterizing the background performance of the detector, featuring the following set of coordinated technologies. The dense target material, combined with the ability of the TPC to distinguish the positions of single- and multiple-vertex interactions, allows for a low-background fiducial target which encompasses a much larger fraction of the total active mass than has been previously attained with sub-tonne scale detectors. The LZ detector will operate in the 300 m3 water tank currently used for the LUX experiment at the Sanford Underground Laboratory, which will render external backgrounds subdominant to contributions from detector construction materials. Background rejection is greatly supplemented by the use of a 14,000 kg organic scintillator surrounding the detector, as well as an outer 1 tonne Xe veto immediately surrounding the active region. The use of these veto volumes enables a significant inner "instant discovery" region with virtually zero background expectation. The greatly enhanced sensitivity of LZ will also facilitate a direct measurement of neutrino flux from astrophysical sources through both electron and nuclear recoil signals. These signals ultimately represent a "noise floor" for WIMP searches with liquid xenon technology.

64. **Antonio Melgarejo**, Columbia University
Plenary Talk: ***New results from XENON100***

July 23, 2012 (9:35 AM - 10:00 AM)
Plenary session

65. **Jonathan A Miller**, Vrije Universiteit Brussel
Talk: ***Search for Secluded Dark Matter in the Sun using the IceCube Neutrino Observatory***

July 23, 2012 (3:30 PM - 3:50 PM)
Parallel session: Indirect Detection I

Co-authors: IceCube Collaboration
In the last decade there has been developing interest in models where dark matter is secluded from the Standard Model via a mediator. Dark matter may be gravitationally captured in the Sun, and annihilate into a non-Standard Model mediator which subsequently decays into Standard Model particles. This mediator's lifetime could be such that decays will occur in the vicinity of the Earth. In IceCube, a cubic-kilometer neutrino detector located below the South Pole, may be used to search for signals of mediator decays near the detector. The result from such a decay, close co-linear muons, can be a unique signal within the IceCube detector, discriminated from atmospheric neutrinos via energy deposition topology in the detector. Here the analysis for secluded dark matter using the 79-string IceCube configuration is presented.

66. **Kentaro Miuchi**, Kobe University
Talk: ***NEWAGE***

July 24, 2012 (4:20 PM - 4:40 PM)
Parallel session: Direct Detection II

Co-authors: NEWAGE group
NEWAGE is a dirction sensitive direct dark matter search with gaseous TPC. Project overvies, current status and latest results will be given.

67. **Emmanuel Moulin**, CEA Saclay, IRFU
Talk: ***Indirect dark matter searches with current imaging atmospheric Cherenkov telescopes***

July 24, 2012 (4:20 PM - 4:40 PM)
Parallel session: Indirect Detection II

Annihilations of dark matter particles can occur in high density regions of our Galaxy such as the Galactic Center region, dwarf galaxy satellites, other types of substructures in Galactic haloes, and clusters of galaxies. High energy gamma rays can be produced in the dark matter particle annihilations and may be detected by current imaging atmospheric Cherenkov telescopes (IACTs) such as HESS, MAGIC or VERITAS. In the absence of a clear signal, modelling the dark matter halo profile of these objects allows to put constraints on the particle physics parameters such as the annihilation cross section and the mass of the dark matter particle. Besides these targeted searches are wide-field survey searches to look for DM annihilations in Galactic subhaloes. I will review on main results from current IACTs on selected targets and using wide-field-surveys. Perspectives for dark matter searches with the next generation of IACTs will be eventually discussed.

68. **Emmanuel Moulin**, CEA Saclay, IRFU
Talk: ***Search for Dark Matter Annihilation Signals from the Fornax Galaxy Cluster with H.E.S.S.***

July 24, 2012 (4:45 PM - 5:05 PM)
Parallel session: Indirect Detection II

Co-authors: for the H.E.S.S. collaboration
The Fornax galaxy cluster was observed with the High Energy Stereoscopic System (H.E.S.S.) for a total live time of 14.5 hours, searching for very-high-energy (VHE, E>100 GeV) gamma-rays from dark matter (DM) annihilation. No significant signal was found in searches for point-like and extended emissions. Using several models of the DM density distribution, upper limits on the DM velocity-weighted annihilation cross-section as a function of the DM particle mass are derived. Constraints are derived for different DM particle models, such as those arising from Kaluza-Klein and supersymmetric models. Various annihilation final states are considered. Possible enhancements of the DM annihilation gamma-ray flux, due to DM substructures of the DM host halo, or from the Sommerfeld effect, are studied. Additional gamma-ray contributions from internal bremsstrahlung and inverse Compton radiation are also discussed. For a DM particle mass of 1 TeV, the exclusion limits at 95% of confidence level reach values of ~ 10^-23cm^3s^-1, depending on the DM particle model and halo properties. Additional contribution from DM substructures can improve the upper limits on by more than two orders of magnitude. At masses around 4.5 TeV, the enhancement by substructures and the Sommerfeld resonance effect results in a velocity-weighted annihilation cross-section upper limit at the level of ~ 10^-26cm^3s^-1.

69. **Tatsuhhiro Naka**, Nagoya University
Talk: ***Directional Dark Matter Search with Nuclear Emulsion***

July 24, 2012 (5:10 PM - 5:30 PM)
Parallel session: Direct Detection II

Co-authors: T. Asada, t. Katsuragawa, K. Hakamata, M. Yoshimoto, M. Nakamura, O. sato, T. Nakano, Y. Tawara, K. Kuge, K. Kuwabara, G. D. Lellis, C. Sirignano, N. D'Ambrosio, A. Russo, A. Aleksandrov
We are developing new dark matter detector that is sensitive to direction by using nuclear emulsion. We developed new nuclear emulsion with extreme high spatial resolution by ourselves in Nagoya university. We can produce the detector of some kg in spite of prototype machine. This detector can detect the tracks of 100 nm length. In addition, by expansion technique and new readout system combined with optical microscopy and X-ray microscopy, automatic readout for very short tracks became possible. For this readout system, we can read out the signal tracks with high angular resolution (less than 20 deg.). Now, we are starting to construct the underground facility in Gran Sasso, Itary for test running and background study with prototype detector.

70. **Sean M Paling**, Boulby Underground Science Facility
Talk: ***Boulby Deep Underground Science Facility: Status and Future Plans***

July 25, 2012 (3:55 PM - 4:15 PM)
Parallel session: Direct Detection III

The Boulby Underground Laboratory is the UK's 1.1km deep science facility located in a working potash and rock-salt mine on the North East coast of England. Since the late 1980s Boulby has hosted Dark Matter search experiments, beginning with Sodium Iodide studies and moving on to the latest ZEPLIN and DRIFT detector technologies. The Dark Matter search projects at Boulby continue with the DRIFT directional dark matter detector and the scientific programme at Boulby is expanding with new projects emerging in the areas of climatology, geomicrobiology, muon tomography & low background counting. This talk will review the current status and future plans for the facility and the science hosted.

71. **Kimberly J Palladino**, MIT
Talk: ***A discussion of the DEAP-3600 calibration systems.***

July 24, 2012 (2:15 PM - 2:35 PM)
Parallel session: Direct Detection II

Co-authors: Joseph J Walding, Royal Holloway, University of London
DEAP-3600 is 3600kg liquid argon dark matter detector observed by 255 eight inch PMTs, at SNOLAB. The calibration of the DEAP-3600 detector will use the intrinsic Ar39 beta spectrum and three dedicated sub-systems: an optical LED and fiber array, external gamma sources, and an external, pulsed DD neutron source. The aim of the calibration is to characterise the energy, radius, and timing response of the detector. This talk will describe the DEAP-3600 calibration systems.

72. **Jong-Chul Park**, Korea Institute for Advanced Study
Talk: ***Assisted freeze-out***

July 25, 2012 (3:55 PM - 4:15 PM)
Parallel session: Particle Physics/Direct Detection I

Co-authors: Genevieve Belanger
We explore a class of dark matter models with two dark matter candidates, only one interacts with the standard model sector. One of the dark matter is thermalized with the assistance of the other stable particle. While both stable particles contribute to the total relic density only one can elastically scatter with nuclei, thus effectively reducing the direct detection rate.

73. **Miguel Pato**, Technical University Munich
Talk: ***Combining direct detection and antiprotons to constrain dark matter models***

July 27, 2012 (11:05 AM - 11:25 AM)
Parallel session: Particle Physics/Direct Detection II

Co-authors: Alejandro Ibarra, Mathias Garny, Stefan Vogl
This work focuses on the complementarity between the latest direct detection and antiproton results in constraining specific dark matter frameworks. We pay close attention to the role of mass degeneracy, and show explicitly that spin-dependent, spin-independent and antiproton limits probe different regions of the dark matter parameter space. Finally, we briefly address the prospects for this type of constraints in the next few years and discuss the complementarity of our results to accelerator searches.

74. **Annika Peter**, UC Irvine
Plenary Talk: ***Astrophysical uncertainties in dark matter detection***

July 25, 2012 (11:35 AM - 12:00 PM)
Plenary session

Most dark-matter searches are focused on detections of astrophysical dark matter. However, the distribution of dark matter in both configuration and velocity space is highly uncertain. In this talk, I review the nature of these uncertainties, and how these uncertainties affect dark-matter parameter (e.g., particle masses, cross sections) constaints or estimation from searches. I will show progress towards being able to learn about the astrophysical distribution from the same dark-matter searches from which we want to learn about the particle nature of dark matter.

75. **Stefano Profumo**, University of California, Santa Cruz
Plenary Talk: ***Fermi from a theorist's perspective***

July 24, 2012 (12:00 PM - 12:25 PM)
Plenary session

76. **Chris Purcell**, University of Pittsburgh
Talk: ***Dark Matter Direct Search Rates in Simulations of the Milky Way and Sagittarius Stream***

July 27, 2012 (9:00 AM - 9:20 AM)
Parallel session: Particle Physics/Direct Detection II

Co-authors: Andrew Zentner, Mei-Yu Wang
We analyze self-consistent N-body simulations of the Milky Way disk and the ongoing disruption of the Sagittarius dwarf satellite to study the effect of Sagittarius tidal debris on dark matter detection experiments. In agreement with significant previous work, we reiterate that the standard halo model is insufficient to describe the non-Maxwellian velocity distribution of the Milky Way halo in our equilibrium halo-only and halo/galaxy models, and offer suggestions for correcting for this discrepancy. More importantly, we emphasize that the dark matter component of the leading tidal arm of the Sagittarius dwarf is significantly more extended than the stellar component of the arm, since the dark matter and stellar streams are not necessarily coaxial and may be offset by several kpc at the point at which they impact the Galactic disk. This suggests that the dark matter component of the Sagittarius debris is likely to have a non-negligible influence on dark matter detection experiments even when the stellar debris is centered several kpc from the solar neighborhood. Relative to models without an infalling Sagittarius dwarf, the Sagittarius dark matter debris in our models induces an energy-dependent enhancement of direct search event rates of as much as ~20 - 45%, an energy-dependent reduction in the amplitude of the annual modulation of the event rate by as much as a factor of two, a shift in the phase of the annual modulation by as much as ~20 days, and a shift in the recoil energy at which the modulation reverses phase. These influences of Sagittarius are of general interest in the interpretation of dark matter searches, but may be particularly important in the case of relatively light (m_X < 20 GeV) dark matter because the Sagittarius stream impacts the solar system at high speed compared to the primary halo dark matter.

77. **Matthew Reece**, Harvard University
Plenary Talk: ***Supersymmetry: Where Do We Stand?***

July 26, 2012 (9:50 AM - 10:15 AM)
Plenary session

I will review the current status of supersymmetry in light of LHC data and other constraints. In particular, both direct searches for supersymmetry at the LHC and the Higgs boson signal place strong constraints on SUSY parameter space. I will discuss some of the surviving scenarios, their possible signals in the future, and some of the implications for dark matter.

78. **Alan E Robinson**, University of Chicago
Talk: ***COUPP Carbon and Fluorine Recoil Thresholds***

July 26, 2012 (3:05 PM - 3:25 PM)
Parallel session: Direct Detection IV

COUPP's exclusion limits for low mass or spin-dependent WIMPs depend on the efficiency for nucleating a bubble in superheated CF$_3$I as a function of recoil energy. Previous measurements of the bubble nucleation efficiency using moderated neutrons provide information on the efficiency integrated to high recoil energy, but not on the shape of the efficiency function. The bubble nucleation rate in the presence of 152 keV neutrons from a a ^{88}Y/Be source has been measured as a function of threshold energy. A measured bubble nucleation efficiency for carbon recoils below 47 keV and fluorine recoils below 30 keV is presented.

79. **Leslie J Rosenberg**, University of Washington
Plenary Talk: ***Status of ADMX***

July 23, 2012 (11:50 AM - 12:15 PM)
Plenary session

80. **Carsten Rott**, Ohio State University / CCAPP
Plenary Talk: ***Latest Results from IceCube***

July 27, 2012 (3:45 PM - 4:10 PM)
Plenary session

Co-authors: for the IceCube Collaboration
With detector construction completed in early 2011, the IceCube neutrino telescope consists of roughly a cubic kilometer of Antarctic ice instrumented with 5160 digital optical modules distributed over 86 strings. It exploits the excellent optical properties of the ice beneath the South Pole to detect neutrinos through the Cherenkov light emission of secondary particles produced by neutrino interactions. IceCube is ideally suited to search indirectly for dark matter via neutrinos from dark matter self-annihilations and has a high discovery potential through striking signatures. Data has been searched for such signals and I will present the latest results from searches for dark matter self-annihilations in the Milky Way and nearby Galaxy clusters. I will further discuss searches for signals from the Sun and Earth. Results from IceCube's low-energy extension, DeepCore, which offers exciting opportunities for dark matter searches down to candidate masses in the physically interesting region of about 50 GeV will be presented. Procedures to compare neutrino searches to direct and accelerator searches will be given.

81. **Jaime Ruz Armendariz**, Lawrence Livermore National Laboratory
Talk: ***Constraints on the axion-electron coupling for the non-hadronic models with CAST***

July 24, 2012 (4:20 PM - 4:40 PM)
Parallel session: Particle Physics

Co-authors: J. Vogel, M.J. Pivovaroff, I.G.Irastorza, B.Lakic, G.Raffelt, J.Redondo
TheCERNAxionSolarTelescope(CAST)isagroundbasedexperimentlocated in Geneva (Switzerland) searching for axions coming from the Sun. Axions, still hypothetical particles, could not only solve the strong CP problem but are also one of the favored candi- dates for dark matter. There are different mechanisms of axion production in the Sun both, model and non-model dependent. The most commonly known is the Primakoff effect, generic feature for the different axionic models. In contrast to hadronic axions, non-hadronic models exhibit tree-level coupling of axions to fermions, which allows for production of axions via axion-electron Compton and Bremsstrahlung processes in the Sun. In this paper, we present novel constraints on the axion-electron coupling in the non-hadronic model scenario of axions using CAST vacuum data.

82. **Sara Rydbeck**, DESY
Talk: ***The inert doublet model and the role of multileptons at the LHC***

July 24, 2012 (2:40 PM - 3:00 PM)
Parallel session: Particle Physics

Co-authors: Michael Gustafsson
The Inert Doublet Model (IDM) is a minimalistic extension of the Standard Model, that both provides a dark matter candidate and allows to alter direct and indirect Standard Model Higgs boson mass limits. A feature of the IDM is that it can evade the "LEP paradox" by allowing for a large Higgs mass while still being in agreement with electroweak precision data. In this talk, I discuss under what conditions the IDM can still accommodate a heavy Higgs and present the prospects for future detection of such IDM scenarios in the four-lepton plus missing energy channel at the LHC.

83. **Richard N Saldanha**, LNGS, Italy
Plenary Talk: ***Status of Darkside***

July 26, 2012 (11:10 AM - 11:35 AM)
Plenary session

84. **Veronique Sanglard**, Institut de Physique Nucleaire de Lyon
Talk: ***EDELWEISS-II WIMP search at low energy***

July 23, 2012 (4:45 PM - 5:05 PM)
Parallel session: Direct Detection I

Co-authors: for the EDELWEISS collaboration
We present the results of a search for WIMPs carried out with low-energy data from a selection of EDELWEISS-II "InterDigit" detectors at the Modane underground laboratory. We demonstrate a sensitivity to nuclear recoils with a very low background from gamma and beta radioactivities down to 6 keV. We put limits on the rate of low-energy nuclear recoils, and we extend the sensitivity of the EDELWEISS-II experiment to low-mass WIMPs with a well-calibrated, low-background and independent dataset. The results exclude a significant fraction of the DAMA-CoGeNT-CRESST parameter region.

85. **Daniel Santos**, LPSC/UJF/CNRS
Talk: ***Directional Detection of DM with MIMAC***

July 24, 2012 (3:55 PM - 4:15 PM)
Parallel session: Direct Detection II

Co-authors: F. Mayet, J. Billard, O, Guillaudin et al.
The bi-chamber module of MIMAC has been installed at the underground laboratory in Modane (France) in June 2012. The potential detection of MIMAC wiil be presented. A selected events will be shown as an illustration of the perspectives opened with this detector.

86. **Maria Luisa Sarsa**, University of Zaragoza
Talk: ***Background model for a NaI(Tl) detector in the frame of the ANAIS experiment***

July 26, 2012 (5:10 PM - 5:30 PM)
Parallel session: Direct Detection IV

Co-authors: J. Amare, S. Borjabad, S. Cebrian, C. Cuesta, D. Fortuno, E. Garcia, C. Ginestra, H. Gomez, M. Martinez, M.A. Olivan, Y. Ortigoza, A. Ortiz de Solorzano, C. Pobes, J. Puimedon, J.A. Villar
In the frame of the ANAIS (Annual modulation with NAI Scintillators) dark matter search project, a large effort has been carried out in order to characterize and understand the background of sodium iodide detectors. We will present in detail the comparison of our background model with the experimental results obtained at the Canfranc Underground Laboratory with a 9.6 kg NaI(Tl) prototype. Most of the contaminations considered as input for the MC simulations (using Geant4) have been precisely identified and quantified by different techniques. Present status of the ANAIS experiment will be also reported.

87. **Stefano Scopel**, Sogang University Korea
Talk: ***Phenomenology of light neutralinos in view of recent results at the CERN Large Hadron Collider***

July 24, 2012 (3:05 PM - 3:25 PM)
Parallel session: Particle Physics

Co-authors: Alessandro Bottino, Nicolao Fornengo
We review the status of the phenomenology of light neutralinos in an effective Minimal Supersymmetric extension of the Standard Model (MSSM) at the electroweak scale, in light of several new results obtained at the CERN Large Hadron Collider related to B physics and Higgs searches.

88. **Silva Scorza**, Southern Methodist University
Talk: ***SuperCDMS-SNOLAB - an active neutron veto shield design***

July 23, 2012 (5:10 PM - 5:30 PM)
Parallel session: Direct Detection I

Protection against neutron backgrounds is one of the key issues for the next generation direct dark matter detection experiment. SuperCDMS is investigating the feasibility of adding a loaded liquid scintillator active neutron veto to the SuperCDMS SNOLAB shield design. Allowing both an in situ evaluation of the neutron flux and a reduction in the unvetoed neutron event rate, an active neutron veto would make the next generation of dark matter experiment more robust improving the credibility of a dark matter detection claim based on the observation of a few recoil events. I will report the status of the related ongoing studies.

89. **Pat Scott**, McGill University
Talk: ***Cosmology with ultracompact minihalos***

July 24, 2012 (5:10 PM - 5:30 PM)
Parallel session: Indirect Detection II

Ultracompact minihalos (UCMHs) of dark matter are expected to form when cosmological overdensities collapse shortly after matter-radiation equality. Such early collapse can be due to the amplitude of primordial perturbations introduced on small scales by inflation, or exotic phenomena such as cosmic strings and phase transitions in the early Universe. I will show how limits on the UCMH abundance in the local region from indirect searches for dark matter translate into limits on cosmological models. This includes direct constraints on the amplitude of primordial perturbations, the range of viable parameter space for slow-roll inflationary models, and the extent of primordial non-Gaussianities.

90. **Osamu Seto**, Hokkai-Gakuen University
Talk: ***Initially asymmetric dark matter***

July 25, 2012 (4:20 PM - 4:40 PM)
Parallel session: Particle Physics/Direct Detection I

Co-authors: Nobuchika Okada
We propose dark matter models where those relic density are determined by the dark matter asymmetry but the nature of particle at present is Majorana by a late time symmetry breaking after the dark matter annihilation for those symmetric abundance.

91. **Bibhushan Shakya**, Cornell University
Talk: ***Direct Detection Implications on Supersymmetry Naturalness***

July 27, 2012 (10:40 AM - 11:00 AM)
Parallel session: Particle Physics/Direct Detection II

Co-authors: Maxim Perelstein
This talk examines the theoretical implications of direct dark matter searches on the naturalness of supersymmetry models. Assuming parameters are independent at weak scale and the absence of large accidental cancellations, low direct detection cross sections are found to require some amount of fine-tuning, implying that current and future bounds from direct searches can impose meaningful constraints on the amount of fine-tuning needed for supersymmetry to provide a viable dark matter candidate.

92. **Chung-Lin Shan**, Academia Sinica
Talk: ***Model-Independent Data Analysis in Direct Searches for Inelastic Dark Matter***

July 27, 2012 (9:50 AM - 10:10 AM)
Parallel session: Particle Physics/Direct Detection II

In this talk we present model-independent data analysis procedures for inelastic Dark Matter scenarios, which can be used for not only identifying inelastic WIMP-nucleus scattering but also reconstructing the mass (splitting) as well as the one-dimensional velocity distribution of inelastic WIMPs. Effects of possible non-negligible background events would also be discussed.

93. **Seodong Shin**, Seoul National University
Talk: ***Dark matter in the PQMSSM in anomaly mediation***

July 25, 2012 (4:45 PM - 5:05 PM)
Parallel session: Particle Physics/Direct Detection I

94. **Tom Shutt**, Case Western Reserve University
Talk: ***The LZ Experiment***

July 25, 2012 (4:20 PM - 4:40 PM)
Parallel session: Direct Detection III

Co-authors: The LZ Collaboration
The LZ collaboration is planning a next generation dark matter experiment based on a two phase Xe TPC with 7 tons of fully active volume. The experiment will be housed in the existing LUX infrastructure and water shield in the Davis Cavern at the Sanford Underground Research Facility (SURF). The detector is an evolution of the LUX design, but features a new liquid scintillator shield that surrounds the central detector. I will discuss the LZ design, experimental program, and science reach.

95. **Jennifer Siegal-Gaskins**, Caltech
Plenary Talk: ***Dark matter searches with Fermi***

July 24, 2012 (11:10 AM - 11:35 AM)
Plenary session

Co-authors: on behalf of the Fermi LAT Collaboration

96. **Sofia Sivertsson**, KTH / Stockholm University
Talk: ***WIMP diffusion in the Solar System and the neutrino signal from the Sun and the Earth***

July 23, 2012 (2:40 PM - 3:00 PM)
Parallel session: Indirect Detection I

Co-authors: Joakim Edsjo
Dark matter in the form of Weakly Interacting Massive Particles (WIMPs) can be captured by the Sun and the Earth, sink to their cores, annihilate and produce neutrinos that can be searched for with neutrino telescopes. The calculation of the capture rates of WIMPs in the Sun and especially the Earth are affected by large uncertainties coming mainly from effects of the planets in the solar system, reducing the capture rates by up to an order of magnitude (or even more in some cases). We show that the WIMPs captured by weak scatterings in the Sun also constitute an important bound WIMP population in the solar system. Taking this population and its interplay with the population bound through gravitational diffusion into account cancel the planetary effects on the capture rates, and the capture essentially proceeds as if the Sun and the Earth were free in the galactic halo. The neutrino signals from the Sun and the Earth are thus significantly higher than claimed in the scenarios with reduced capture rates.

97. **Andrew W Smith**, University of Utah
Talk: ***The VERITAS Indirect Dark Matter Detection Program***

July 27, 2012 (9:50 AM - 10:10 AM)
Parallel session: Indirect Detection IV

Co-authors: The VERITAS Collaboration
In the cosmological paradigm, Cold Dark Matter (DM) dominates the mass content of the Universe and is present at every scale. Candidates for DM include many extensions of the standard model, with a Weakly Interacting Massive Particle (WIMP) in the mass range from 50 GeV to greater than 10 TeV. The self-annihilation of WIMPs in astrophysical regions of high DM density can produce secondary particles including Very High Energy (VHE) gamma rays with energies up to the DM particle mass. The VERITAS array of Cherenkov telescopes, designed for the detection of VHE gamma rays in the 100 GeV-10 TeV energy range, is an appropriate instrument for the indirect detection of DM. Among the possible astrophysical objects considered to be candidates for indirect DM detection, VERITAS has focused on observations of dwarf spheroidal galaxies (dSphs) of the Local Group, the Milky Way galactic center, Fermi-LAT unidentified GeV sources and the local group galaxy M31. This presentation reports on our extensive observations of these targets and our present exclusion regions obtained on the thermally averaged annihilation cross section of the WIMP derived from these observations.

98. **Daniel P. Snowden-Ifft**, Occidental College
Plenary Talk: ***Overview of directional dark matter detectors***

July 25, 2012 (9:50 AM - 10:15 AM)
Plenary session

99. **Andrew Sonnenschein**, Fermilab
Talk: ***COUPP-60***

July 26, 2012 (3:30 PM - 3:50 PM)
Parallel session: Direct Detection IV

Co-authors: COUPP Collaboration
The COUPP-60 bubble chamber is a scaled-up version of the successful COUPP-2/4 concept, with a 20-fold increase in WIMP target mass and reduced neutron backgrounds due to improvements in material selection and shielding. It is expected to accumulate a 10,000 kg-day exposure in one year of underground running and reach sensitivity of

100. **Christian Strandhagen**, Kepler Center for Astro and Particle Physics Tuebingen University
Plenary Talk: ***The CRESST-II experiment - status update***

July 24, 2012 (9:25 AM - 9:50 AM)
Plenary session

Co-authors: C. Strandhagen, G. Angloher, M. Bauer, I. Bavykina, A. Bento, C. Bucci, C. Ciemniak, G. Deuter, F. von Feilitzsch, D. Hauff, P. Huff, C. Isaila, J. Jochum, M. Kiefer, M. Kimmerle, C. Kister, J.-C. Lanfranchi, F. Petricca, S. Pfister, W. Potzel, F. Probst, F. Reindl, S. Roth, K. Rottler, C. Sailer, K. Schaffner, J. Schmaler, S. Scholl, W. Seidel, M. von Sivers, L. Stodolsky, R. Straub, A. Tanzke, I. Usherov, S. Wawoczny, M. Willers, A. Zoller
The CRESST-II experiments aims for the detection of dark matter in the form of WIMPs via their elastic scattering off nuclei. To achieve this, cryogenic detectors containing CaWO4 crystals are employed, simultaneously recording the phonon signal and the produced scintillation light. The results of the latest experimental run with a net exposure of 730 kg days, where an excess of events in the WIMP search region was observed, are presented. In addition, an outlook for the upcoming run is given.

101. **Meng Su**, Harvard University/MIT
Talk: ***Evidence for Gamma-ray Jets in Our Milky Way***

July 24, 2012 (3:55 PM - 4:15 PM)
Parallel session: Indirect Detection II

Co-authors: Douglas Finkbeiner
Abstract: Based on data from the Fermi Gamma-ray Space Telescope, we have discovered two gigantic gamma-ray emitting bubble structures in our Milky Way (known as the Fermi bubbles), extending ~50 degrees above and below the Galactic center with a width of ~40 degrees in longitude. The gamma-ray emission associated with these bubbles has a significantly harder spectrum (dN/dE ~ E^(-2)) than the inverse Compton emission from known cosmic ray electrons in the Galactic disk, or the gamma-rays produced by decay of pions from proton-ISM collisions. There is no significant difference in the spectrum or gamma-ray luminosity between the north and south bubbles. The bubbles are spatially correlated with the hard-spectrum microwave excess known as the WMAP haze; we also found features in the ROSAT soft X-ray maps at 1.5 - 2 keV which line up with the edges of the bubbles. The Fermi bubbles are most likely created by some large episode of energy injection in the Galactic center, such as past accretion events onto the central massive black hole, or a nuclear starburst in the last ~10 Myr. Study of the origin and evolution of the bubbles also has the potential to improve our understanding of recent energetic events in the inner Galaxy and the Galactic cosmic ray acceleration. Furthermore, we have recently identified a gamma-ray cocoon feature within the southern bubble, with a jet-like feature along the cocoon's axis of symmetry, and another directly opposite the Galactic center in the north. If confirmed, these jets are the first resolved gamma-ray jets ever seen.

102. **Yoichiro Suzuki**, Kamioka Observatory, ICRR, U. of Tokyo
Plenary Talk: ***The XMASS Experiment***

July 25, 2012 (11:10 AM - 11:35 AM)
Plenary session

Co-authors: XMASS collaboration
Give a status and results of XMASS

103. **Matthew M Szydagis**, UC Davis
Talk: ***Calibrations of the LUX Detector on the Surface***

July 25, 2012 (3:30 PM - 3:50 PM)
Parallel session: Direct Detection III

Co-authors: LUX collaboration
Prior to beginning the effort towards deployment underground at the Homestake mine for a dark matter WIMP search run, the LUX direct dark matter detector, a two-phase xenon TPC, underwent an engineering run on the surface at the Sanford Lab in Lead, South Dakota. A Cs-137 661.7 keV gamma source, as well the naturally-occurring muons from cosmic rays, among other sources of natural radioactivity, were used effectively in order to determine LUX detector properties such as the total geometric light collection efficiency, the reflectivity of the PTFE walls when submerged in liquid xenon, and the photon absorption length, as a function of time, as the xenon underwent purification. Comparisons were made between the data and the LUXSim comprehensive simulation package infused with the Noble Element Simulation Technique (NEST, a scintillation physics model) and running under Geant4. The resulting discovery that the LUX detector has an excellent light yield even prior to the completion of purification will be presented, along with accompanying results for the light collection parameters.

104. **Tim M.P. Tait**, University of California, Irvine
Plenary Talk: ***Dark matter searches at the LHC (theory)***

July 26, 2012 (9:00 AM - 9:25 AM)
Plenary session

105. **Marco Taoso**, University of British Columbia
Plenary Talk: ***Dark matter with radio telescopes***

July 27, 2012 (2:50 PM - 3:15 PM)
Plenary session

106. **David Tran**, University of Minnesota
Talk: ***Cosmic-ray and gamma-ray constraints on dark matter stability***

July 27, 2012 (10:15 AM - 10:35 AM)
Parallel session: Indirect Detection IV

Co-authors: Alejandro Ibarra, Mathias Garny, Christoph Weniger
We examine different constraints on dark matter stability from cosmic-ray and gamma-ray observations and their complementarity through higher-order effects. Two and three-body decays of dark matter particles into charged leptons and quarks generically induce decays into monochromatic photons at the quantum level. We present a general model-independent analysis of hadronic constraints in the mass-lifetime parameter space and compare those constraints to current and projected limits on gamma-ray lines. We also discuss how the production of monochromatic photons can be enhanced by kinematic effects, potentially giving rise to observable lines in the gamma-ray sky.

107. **Eric Vazquez-Jauregui**, SNOLAB
Talk: ***COUPP500: A 500kg CF3I Bubble Chamber***

July 26, 2012 (3:55 PM - 4:15 PM)
Parallel session: Direct Detection IV

Co-authors: COUPP collaboration
The COUPP collaboration uses CF3I bubble chambers to search for dark matter candidates in the form of WIMPs, by the nuclear recoils that they should induce. The detectors are sensitive to both spin-dependent (SD) and spin-independent (SI) WIMP interactions. The target material in the COUPP devices is in a mild superheated state with a gamma rejection factor of Â»10-10. Particles crossing the CF3I deposit energy, evaporating a small amount of material, which leads to the production of bubbles that are recorded by cameras. In addition, piezo transducers allow discrimination between alphas and nuclear recoils. COUPP-4kg recently completed the first physics run deep undeground at SNOLAB, while COUPP-60kg is being moved from Fermilab to SNOLAB, planning to start data taking in late 2012. COUPP-500kg will be the next generation detector in the COUPP campaign, a 500kg CF3I bubble chamber, having a spin independent WIMP-nucleus cross-section sensitivity of Â»10-47 cm2 after one year running, free of backgrounds. The current status of the R&D phase for COUPP-500kg will be presented in this talk, focusing on simulations to estimate the expected backgrounds in the detector.

108. **Jussi Virkajarvi**, CP3-Origins & DIAS, University of Southern Denmark
Talk: ***Invisible Higgs and Dark Matter***

July 24, 2012 (3:30 PM - 3:50 PM)
Parallel session: Particle Physics

Co-authors: Heikinheimo Matti, Tuominen Kimmo
We investigate the possibility that a massive weakly interacting fermion simultaneously provides for a dominant component of the dark matter relic density and an invisible decay width of the Higgs boson at the LHC. Taking into account the constraints from the electroweak precision measurements and current direct searches for dark matter particles, we find that such scenario is heavily constrained. As a concrete model realizing such dynamics we consider the minimal walking technicolor, although our results apply more generally. Based on the work: arXiv:1203.5766

109. **Julia K Vogel**, Lawrence Livermore National Laboratory
Talk: ***The International Axion Observatory (IAXO)***

July 24, 2012 (4:45 PM - 5:05 PM)
Parallel session: Particle Physics

Co-authors: IAXO Collaboration: I.G. Irastorza, F.T. Avignone, S. Caspi, J.M. Carmona, T. Dafni, M. Davenport, A. Dudarev, G. Fanourakis, E. Ferrer-Ribas, J. Galan, J.A. Garcia, T. Geralis, I. Giomataris, H. Gomez, D.H.H. Hoffmann, F.J. Iguaz, K. Jakovcic, M. Krcmar, B. Lakic, G. Luzon, M. Pivovaroff, T. Papaevangelou, G. Raffelt, J. Redondo, A. Rodriguez, S. Russenschuck, J. Ruz, I. Shilon,d, H. Ten Kate, A. Tomas, S. Troitsky, K. van Bibber, J.A. Villar, J. K. Vogel, L. Walckiers and K. Zioutas
Axion helioscopes are searching for solar axions, which could be produced in the core of the Sun via the Primakoff effect. Not only would these hypothetical particles solve the longstanding strong CP problem, but they are also one of the favored candidates for dark matter. The International Axion Observatory (IAXO) is a next generation axion helioscope aiming at sensitivity to the axion-photon coupling of a few 10-12 GeV-1, i.e. 1 - 1.5 orders of magnitude beyond the one achieved by the currently most sensitive axion helioscope, the CERN Axion Solar Telescope (CAST). Crucial factors in improving the sensitivity for IAXO are the increase of the magnetic field volume together with the extensive use of x-ray focusing optics and low background detectors, innovations already successfully tested at CAST. In case of hadronic axion models, i.e if axions also couple to electrons, the Sun produces a larger flux as expected for non-hadronic models at the same value of the Peccei-Quinn scale. This allows for probing a broader range of models. IAXO will be the most sensitive axion search over a broad range of axion masses, reaching or surpassing the stringent bounds from SN1987A. It will possibly be testing the axion interpretation of anomalous white-dwarf cooling for which an axion mass of a few meV is predicted. Beyond standard axions, this new experiment will be able to search for a large variety of axion-like particles (ALPs) and other novel exitations at the low-energy frontier of elementary particle physics in entirely unexplored ranges of parameters.

110. **Philip von Doetinchem**, UC Berkeley, Space Sciences Laboratory
Talk: ***The General Antiparticle Spectrometer (GAPS) - Hunt for dark matter using low energy antideuterons***

July 26, 2012 (5:10 PM - 5:30 PM)
Parallel session: Indirect Detection III

Co-authors: Tsuguo Aramaki, Florian Gahbauer, Charles Hailey (PI), Norm Madden, Kaya Mori, Kerstin Perez, Nobutaka Bando, Hideyuki Fuke, Atsushi Takada, Tetsuya Yoshida, Steven Boggs, Philip von Doetinchem, Jane Hoberman, Steve McBride, William Craig, Isaac Mognet, Rene Ong, Jeffrey Zweerink
The GAPS experiment is foreseen to carry out a dark matter search using low energy cosmic ray antideuterons (< 0.3GeV/n) using a novel detection approach. The theoretically predicted antideuteron flux resulting from secondary interactions of primary cosmic rays, e.g. protons, with the interstellar medium is very low. So far not a single cosmic antideuteron has been detected by any experiment but well-motivated theories beyond the standard model of particle physics, e.g. supersymmetry or universal extra dimensions, contain viable dark matter candidates which could led to a significant enhancement of the antideuteron flux due to self-annihilation of the dark matter particles. This flux contribution is believed to be especially large at small energies which leads to a high discovery potential for GAPS. In comparison to other experiments, GAPS will be able to measure antideuterons at lower energies than the upcoming AMS-02 experiment and will partly cover complementary parameter space regions of dark matter scenarios studied by direct dark matter underground searches. GAPS is designed to achieve its goals via a series of ultra-long duration balloon flights at high altitude in Antarctica. The detector itself will consist of 13 planes of Si(Li) solid state detectors and a time-of-flight system. The antideuterons will be slowed down in the Si(Li) material, replace a shell electron and form an excited exotic atom. The atom will be deexcited by characteristic x-ray transitions and will end its life by the formation of an annihilation pion/proton star. This unique event structure will deliver a nearly background free detection possibility. To prove the performance of the different detector components we carried out a GAPS prototype flight from Taiki Japan in June 2012. We studied the behavior of Si(Li) tracker modules at float altitude and ambient pressure using an onboard X-ray tube and combined tracks in the tracker and TOF systems, the Si(Li) cooling approach, and measured the incoherent background level in a flight like configuration. This presentation will report on the general GAPS concept and first analysis results of the successful prototype flight.

111. **Mei-Yu Wang**, University of Pittsburgh
Talk: ***Constraints on Decaying Dark Matter from Large-Scale Structure***

July 27, 2012 (9:25 AM - 9:45 AM)
Parallel session: Structure and Stars

Co-authors: Andrew Zentner
I consider cosmological constraints for a class of decaying dark matter model in which a dark matter particle decays into a slightly less massive stable daughter particle along with a relativistic daughter particle. The decay imparts a small kick velocity on the massive daughter particles. These kick velocities lead to a free-streaming suppression of matter density fluctuations. Alterations to structure growth in such scenarios can include suppression of dark matter halo density profiles as well as dissolution of small halos and these models have been suggested as a possible avenue with which to address some of the small-scale challenges to the cold dark matter model of structure growth. I will present new limits on unstable dark matter models using Lyman-alpha forest data sets combined with WMAP7 data, and I will also discuss the possible improvements on contemporary constraints from forthcoming surveys, particularly those constraints from weak gravitational lensing.

112. **Christoph Weniger**, Max Planck Institute for Physics, Munich
Talk: ***A tentative gamma-ray line from dark matter annihilation at the Fermi Large Area Telescope***

July 24, 2012 (3:05 PM - 3:25 PM)
Parallel session: Indirect Detection II

Using 43 months of public gamma-ray data from the Fermi Large Area Telescope, we find in regions close to the galactic center at energies of 130 GeV a 4.6 sigma excess that is not inconsistent with a gamma-ray line from dark matter annihilation. When taking into account the look-elsewhere effect, the significance of the observed signature is 3.3 sigma. If interpreted in terms of dark matter particles annihilating into a photon pair, the observations imply a partial annihilation cross-section of about 10^-27 cm^3 s^-1 and a dark matter mass around 130 GeV. We will discuss details of the statistical analysis, caveats and future prospects.

113. **Daniel Whiteson**, UC Irvine
Plenary Talk: ***Dark Matter searches at the LHC (experiment)***

July 26, 2012 (9:25 AM - 9:50 AM)
Plenary session

114. **Wei Xue**, Physics Department, McGill University
Talk: ***An optimistic CoGeNT analysis***

July 25, 2012 (5:35 PM - 5:55 PM)
Parallel session: Particle Physics/Direct Detection I

Co-authors: Jim Cline, Zuowei Liu
Inspired by a recently proposed model of millicharged atomic dark matter (MADM), we analyze several classes of light dark matter models with respect to CoGeNT modulated and unmodulated data, and constraints from CDMS, XENON10 and XENON100. After removing the surface contaminated events from the original CoGeNT data set, we find an acceptable fit to all these data (but with the modulating part of the signal making a statistically small contribution), using somewhat relaxed assumptions about the response of the null experiments at low recoil energies, and postulating an unknown modulating background in the CoGeNT data at recoil energies above 1.5 keVee. We compare the fits of MADM---an example of inelastic magnetic dark matter---to those of standard elastically and inelastically scattering light WIMPs (eDM and iDM). The iDM model gives the best fit, with MADM close behind. The dark matter interpretation of the DAMA annual modulation cannot be made compatible with these results however. We find that the inclusion of a tidal debris component in the dark matter phase space distribution improves the fits or helps to relieve tension with XENON constraints.

115. **Qiaoli Yang**, University of Florida
Talk: ***Axion BEC: a model beyond CDM***

July 24, 2012 (5:10 PM - 5:30 PM)
Parallel session: Particle Physics

Co-authors: Heywood Tam, Ozgur Erken, and Pierre Sikivie
Cold dark matter axions form a Bose-Einstein condensate if the axions thermalize. Recently, it was realized that they do thermalize when the photon temperature reaches approximately 500eV. We discuss the differences between axion BEC and CDM in the linear regime and the non-linear regime of evolution of density perturbations. We find that axion BEC provides a mechanism for the production of net overall rotation in dark matter halos. We also find that Axion BEC may alleviate the ^7Li problem of standard BBN.

116. **Gabrijela Zaharijas**, ICTP, Trieste
Talk: ***Constraints on dark matter annihilation and decay in the Milky Way halo***

July 24, 2012 (3:30 PM - 3:50 PM)
Parallel session: Indirect Detection II

Co-authors: Alessandro Cuoco, Jan Conrad, Zhaoyu Yang (for the Fermi-LAT collaboration)
Indirect DM searches through gamma rays produced in DM annihilation/decay in the Milky Way halo are promising means to test the WIMP paradigm due to the high DM density in the inner Galaxy and proximity of the target. Propagation of Galactic cosmic rays also produces diffuse gamma rays which represent a major foreground for these searches. In this talk we report results of an analysis in which we test the Fermi-LAT diffuse data for a contribution from a DM annihilation/decay signal by marginalizing over several parameters that determine the contribution from cosmic-ray-induced diffuse gamma-ray emission. We present competitive constraints from this analysis on the DM annihilation cross section and decay lifetime for several DM channels.

117. **Hannes-S. Zechlin**, University of Hamburg, Germany
Talk: ***Dark matter subhalos: the observational challenge***

July 26, 2012 (3:30 PM - 3:50 PM)
Parallel session: Indirect Detection III

Co-authors: D. Horns
The hierarchical formation of structures in the Universe predicts galactic dark matter (DM) halos to host a variety of bound DM substructures, so-called DM subhalos. Covering a mass range from Earth mass to the scale of dwarf spheroidal galaxies, DM subhalos serve as "smoking gun" objects to search for annihilation signals from particle DM. The energy released by self-annihilating heavy DM particles within these objects will be partially emitted by photons in the gamma-ray band, predicting DM subhalos to appear as faint and temporally constant gamma-ray sources without astrophysical counterparts. In this talk, we provide predictions for the observational properties of DM subhalos, based upon realistic subhalo models and current constraints on annihilating DM. Governed by our prediction of a few subhalos to appear in the current data set of Fermi-LAT, we present candidate searches in the first and second release of the Fermi-LAT catalog. We review multi-wavelength studies of the most promising objects and discuss observational capabilities to discriminate candidate sources from AGN or high-energy pulsars. We also discuss the sensitivity of current and planned high- and very-high energy gamma-ray telescopes regarding subhalo searches and strategies for future investigations.

118. **Andrew Zentner**, University of Pittsburgh
Talk: ***Asymmetric Dark Matter may Alter the Conditions for Stardom***

July 27, 2012 (9:00 AM - 9:20 AM)
Parallel session: Structure and Stars

Co-authors: Andrew P. Hearin
I study energy transport by asymmetric dark matter (ADM) in very low-mass stars and brown dwarfs in order to explore astrophysical signatures of ADM, which may not otherwise be amenable to indirect searches. ADM models have garnered significant attention recently due to hints of low-mass dark matter in direct search experiments alongside ever more restrictive constraints on WIMP dark matter from the Fermi Gamma-ray Space Telescope. In viable models, the additional cooling of low-mass stellar cores can alter stellar properties. ADM with mass $4 lesssim Mx/mathrm{GeV} lesssim 10$ and a spin-dependent (spin-independent) cross section of $sigma_{mathrm{p}}^{mathrm{SD}} sim 10^{-37}, mathrm{cm}^2$ ($sigma_{mathrm{p}}^{mathrm{SI}} sim 10^{-40}, mathrm{cm}^2$) increases the minimum mass of main sequence hydrogen burning, partly determining whether or not the object is a star at all. Similar dark matter candidates reduce the luminosities of low-mass stars dramatically and greatly accelerate the cooling of brown dwarfs. Such light dark matter is of interest given results from the DAMA, CoGeNT, and CRESST dark matter searches. I conclude with possible strategies for observing these phenomena and exploiting them to constrain dark matter models.

119. **Donghai Zhao**, Shanghai Astronomical Observatory
Talk: ***Tthe universal mass-concentration relation for cold, warm and hot dark matter halos***

July 27, 2012 (9:50 AM - 10:10 AM)
Parallel session: Structure and Stars

Co-authors: Jing, Yipeng; Mo, Houjun; Boerner, Gerhard
In a previous paper, Zhao et al. (2009), we proposed a very simple but physically motivated model for the mass accretion histories and concentrations of dark matter halos, which has been proved to be accurate for universes of initial density fluctuations with zero-varying or slow-varying power spectrum, such as scale free and cold dark matter power spectra. In this paper, we apply exactly the same model, without any modification to the function form or even to the parameters, to various warm and hot dark matter universes, in which spectrum power index varies very fast with scale. The model predicts concentration-mass relations, like a Mexican hat with concentrations topping out at intermediate halo masses and flatting at very light and massive ends, for the hot and some warm dark matter cases. This is much different from those relations, with concentrations monotonically decreasing with masses, for the scale free spectra and cold dark matter cases. This is because halo formation time t0.04, predicted by our model for these hot cases, also peaks at these intermediate halo masses and so below these masses the smaller the halos, the later they formed, unlike the bottom-up hierarchical clustering universe where smaller halos always formed earlier on average than massive ones. We compare these model predictions with concentration-mass relations from the literature and from our cosmological numerical simulations and find very good agreement while all other models failed dramatically.