The Kavli Institute for Cosmological Physics (KICP) at the University of Chicago is hosting a workshop this fall on theories of modified gravity. The purpose of workshop is to discuss recent progress and interesting directions in theoretical research into modified gravity. Topics of particular focus include: massive gravity, Horndeski, beyond Horndeski, and other derivatively coupled theories, screening and new physics in the gravitational sector, and possible observational probes of the above. The meeting will be relatively small, informal, and interactive workshop for the focused topics.

**Organizing Committee**

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<tr>
<th>Scott Dodelson</th>
<th>Wayne Hu</th>
<th>Austin Joyce</th>
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<tr>
<td>Fermilab, University of Chicago</td>
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<td>Hayato Motohashi</td>
<td>Lian-Tao Wang</td>
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<td>University of Chicago</td>
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1. **Claudia de Rham**, Case Western Reserve University
   *Invited Talk*: Non-trivial vacua
   October 12, 2015 (10:15 AM - 10:40 AM)

2. **Cedric Deffayet**, CNRS
   *Invited Talk*: P-form Galileons
   October 14, 2015 (10:15 AM - 10:40 AM)

3. **Gregory Gabadadze**, New York University
   *Invited Talk*: A New Approach to Big Cosmological Constant and Dark Energy
   October 12, 2015 (2:40 PM - 3:05 PM)

4. **Kurt Hinterbichler**, Perimeter Institute for Theoretical Physics
   *Invited Talk*: A Stueckelberg approach to quadratic curvature gravity and its decoupling limits
   October 12, 2015 (4:30 PM - 4:55 PM)

5. **Lam Hui**, Columbia University
   *Invited Talk*: Symmetries in gravity and large scale structure
   October 13, 2015 (2:30 PM - 2:55 PM)

6. **Nemanja Kaloper**, University of California, Davis
   *Invited Talk*: Lambda: The Sequester
   October 14, 2015 (11:20 AM - 11:45 AM)

7. **Kazuya Koyama**, Institute of Cosmology and Gravitation, University of Portsmouth
   *Invited Talk*: Phenomenology of beyond Horndeski theories
   October 13, 2015 (11:20 AM - 11:45 AM)

8. **David Langlois**, Astroparticle and Cosmology Laboratory, Paris
   *Invited Talk*: Exploring theories beyond Horndeski
   October 13, 2015 (9:40 AM - 10:05 AM)

9. **Andrew Matas**, Case Western Reserve University
   *Poster*: Charged Spin 2 Fields
   October 12 - 14, 2015

In light of recent progress in ghost-free theories of massive gravity and multi-gravity, we reconsider the problem of constructing a ghost-free theory of an interacting spin-2 field charged under a U(1) gauge symmetry. Our starting point is the theory originally proposed by Federbush, which is essentially Fierz–Pauli generalized to include a minimal coupling to a U(1) gauge field. We show the Federbush theory with a dynamical U(1) field is in fact ghost-free and can be treated as a healthy effective field theory to describe a massive charged spin-2 particle. It can even potentially have healthy dynamics above its strong-coupling scale. We then construct candidate gravitational extensions to the Federbush theory both by using dimensional deconstruction, and by constructing a general nonlinear completion. However, we find that the U(1) symmetry forces us to modify the form of the Einstein–Hilbert kinetic term. By performing a constraint analysis directly in the first-order form, we show that these modified kinetic terms inevitably reintroduce the Boulware–Deser ghost. As a by-product of our analysis, we present a new proof for ghost-freedom of bi-gravity in 2+1 dimensions (also known as Zwei-Dreibin gravity). We also give a complementary algebraic argument that the Einstein–Hilbert kinetic term is incompatible with a U(1) symmetry, for a finite number of gravitons.
10. **Shinji Mukohyama**, Yukawa Institute for Theoretical Physics, Kyoto University  
*Invited Talk*: Massive gravity and cosmology  
October 13, 2015 (4:20 PM - 4:45 PM)

11. **Alberto Nicolis**, Columbia University in the City of New York  
*Invited Talk*: Icosahedral inflation  
October 14, 2015 (9:40 AM - 10:05 AM)

12. **Gustavo Niz**, University of Guanajuato, Mexico  
*Invited Talk*: On the Vainshtein mechanism  
October 13, 2015 (11:55 AM - 12:20 PM)

*Invited Talk*: On Recent Developments in Partially Massless Gravity  
October 12, 2015 (9:40 AM - 10:05 AM)

14. **Teruaki Suyama**, Research Center for the Early Universe, University of Tokyo  
*Invited Talk*: Spontaneous scalarization: asymmetron as dark matter  
October 12, 2015 (11:55 AM - 12:20 PM)

15. **Gianmassimo Tasinato**, Swansea University  
*Invited Talk*: Vector fields, galileons, and modified gravity  
October 13, 2015 (3:05 PM - 3:30 PM)

16. **Filippo Vernizzi**, CEA  
*Invited Talk*: A unifying description of dark energy  
October 13, 2015 (10:15 AM - 10:40 AM)

17. **Masahide Yamaguchi**, Tokyo Institute of Technology  
*Invited Talk*: Perturbations of Cosmological and Black Hole Solutions in Massive gravity and Bi-gravity  
October 12, 2015 (11:20 AM - 11:45 AM)

18. **George Zahariade**, University of California, Davis  
*Invited Talk*: A manifestly local theory of vacuum energy sequestering  
October 12, 2015 (3:15 PM - 3:40 PM)