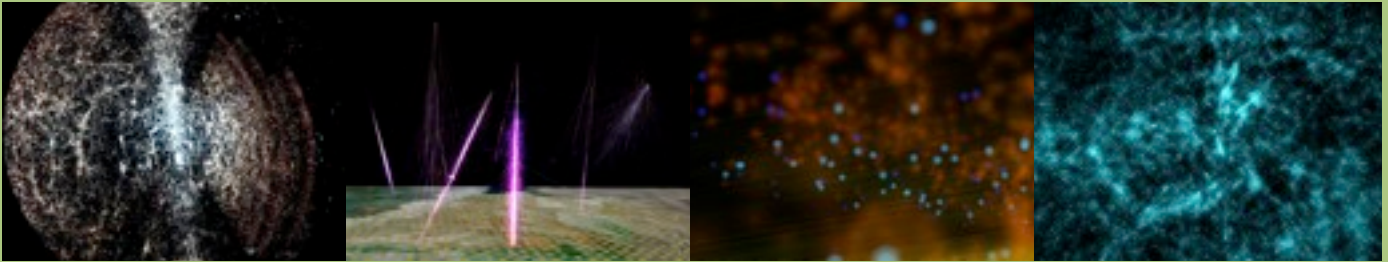


# Preparing Visualizations for Adler's Theaters



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## Overview

The Adler Planetarium houses two state of the art visualization theaters. The Universe 3D Theater contains a stereoscopic HD (1920x1080p) display, with a server capable of playing back fully uncompressed video. The definiti® Theater is a full-dome ( $2\pi$  steradians) theater with approximately 4Kx4K resolution. In each theater there exists the possibility of playing back rendered video sequences and interactively exploring point based datasets. This document describes each of the possibilities in turn.

## Pre-Rendered Video

The creation of video for either theater requires custom encoding. Adler staff will take care of that, but we ask that you provide image sequences in the proper format. Associated audio files may be provided as well.

**STEREOSCOPIC HD VIDEO:** Image sequences should be provided in separate directories for both the left and right eye view. It is important that no extraneous files are in that directory and that the image sequence is clearly labeled (i.e. VizL0001.tif). The images should be 1920x1080, LZW compressed tiff files. Audio files may be provided as well. The accepted format is 48kHz 24bit WAV files.



**FULL DOME VIDEO:** The standard format for distributing video to full dome theaters is the dome master. The dome master is a square image in which a circular image is inscribed. This circular image contains a 180° fisheye view. The preferred resolution for our theater is 4096x4096, however lower resolutions may be provided. Most common image formats can be used.

In some special cases direct fisheye rendering is possible, however a more common scenario is one where the fisheye view is constructed from several camera views. The most straightforward way to accomplish this is to construct a camera rig, where each camera renders one side of a cube. Five sides of the cube are the minimum needed to construct the dome master. You may choose to render all six sides of the cube encoding the full 360° view, allowing for greater camera control in the final render.

Each camera in the cubic rig should render a square image representing a 90° field of view which is 1/2 of the desired resolution of the dome master (i.e. to create a 4096x4096 dome mater, five sides of the cube need to be rendered at 2048x2048). Separate dome stitching software is required in order to assemble these images into the dome master.

The definiti dome's *sweet spot* is roughly 45° up from the springline at the front of the dome. On the domemaster this corresponds to the midpoint between the center and bottom of the image.

## Dome Stitching Software

Cube2Dome by Paul Bourke (\$30, <http://local.wasp.uwa.edu.au/~pbourke/miscellaneous/domefisheye/cube2dome/>, mac OS X) is highly recommended. This packages accepts a 5 or 6 sides of the cube and allows the user to independently script the rotation of the fisheye camera if desired. It imports and exports targa formatted images. A free option exists for Win XP, GLOM (free, <http://extranet.spitzinc.com/download/downloadglom.aspx>).

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## Interactive Dataset Visualization

There are a number of possible mechanisms for the interactive display of data in the definiti and Universe theaters - this document will attempt only to describe only one. Data in the Partiview format (see <http://dart.ncsa.uiuc.edu/partiview/>) can easily be displayed and manipulated in the stereoscopic theater. The same data format can be imported into the Digital Sky software which drives the definiti full-dome theater. Point based data are displayed with optional attached image glyphs. Time varying data sets are also accepted. The format is ASCII, a header followed by columns (cartesian x,y,x) and the optional parameters which can be used to specify the color, brightness or glyph to be applied. Galactic coordinates are preferred for import into DigitalSky.

### Data Example:

```
datavar 0 mass
datavar 1 radius
texturevar 6
texture -M 1 star.sgi
datetime 0
  0.422974 1.379403 0.281208 1.438885 1.000852 1.194000 518800.038929 12 4224 1
-1.333218 2.809710 -2.614179 1.436902 1.001421 1.489000 475335.225943 12 5831 1
datetime 1
-0.543837 0.471114 0.846222 1.438885 1.000852 1.194000 518800.038929 12 4224 1
-1.294863 3.837273 -3.062954 1.436902 1.001421 1.489000 475335.225943 12 5831 1
```

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## Contact Information:

Please contact us with any additional questions or requests for assistance: [astroviz@adlerplanetarium.org](mailto:astroviz@adlerplanetarium.org)

## Adler Planetarium and Astronomy Museum



The Adler Planetarium — America's First Planetarium — was founded in 1930 by Chicago business leader Max Adler. The museum is home to three full-size theaters, including the all-digital projection definiti® Space Theater, the Sky Theater which utilizes a Zeiss optical projector, and the Universe 3D Theater. It is also home to one of the world's most important antique instrument collections. The Adler is a recognized leader in science education, with a focus on inspiring young people, particularly women and minorities, to pursue careers in science.