



3D Data Visualization in Radio Astronomy

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Extended Abstract

Data visualization is increasingly important in astronomy due to the volume of data in observations and simulations, and the complexity of analysis often required to interpret value-added data products. The amount of frequency coverage, data rates, and bandwidth from radio telescope facilities has opened up many new areas of astronomical exploration across the spectrum. Data from radio telescopes can include survey imaging, N-dimensional data cubes, and catalogs. 3D rendering software not traditionally used in astronomy has the benefit of mature APIs and flexible interfaces that will work with a variety of data formats. We present a unique methodology for rendering three-dimensional data using the open-source software package *Blender* [1]. Through a Python API and interface, one can import a variety of data formats into a voxel data structure that can be rendered as a high-resolution animation. By importing processed observations and numerical simulations through the Voxel Data format, we can achieve transparent rendering of data cubes. Using single mesh objects, we can deform vertices to create highly efficient catalog visualizations that render quickly for simulations and catalogs. Workflow elements of data import, model construction, animation, virtual camera movement, and data export are described [2]. Examples include extragalactic catalogs, galaxy simulations, and all-sky maps. In addition, we show methods that allow for 360 degree video to be rendered and displayed on mobile and tablet devices [3]. Rendering astronomical data in three dimensions gives scientists the ability to create visualizations that can be used for both scientific presentations as well as public outreach.

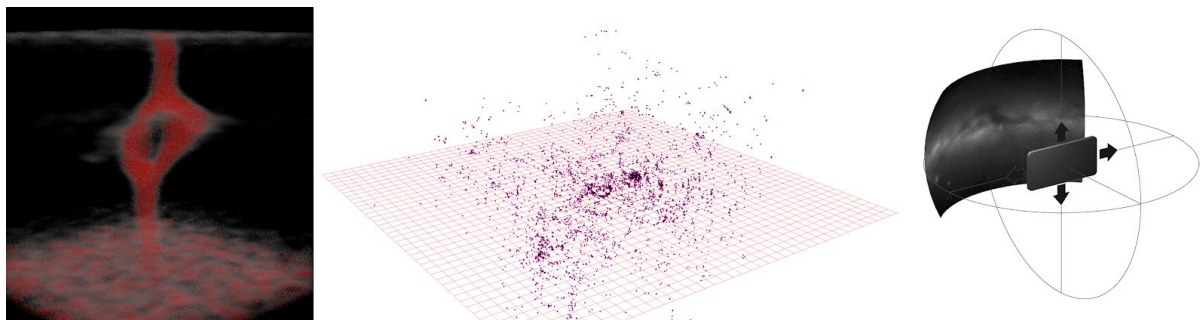


Figure 1. Left to right show (a) a rendered cube of CO gas inside a protoplanetary gap [4], (b) an extragalactic catalog of galaxies in the nearby Universe [5], and (c) a schematic diagram of a mobile device being used to explore all sky maps [3].

References

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