

The background of the slide is a vibrant, abstract 3D visualization of simulated astrophysical plasmas. It features a complex, multi-colored structure with swirling patterns in shades of orange, red, and purple, set against a dark, almost black background. The overall appearance is that of a turbulent, energetic environment, possibly representing a star-forming region or a galaxy cluster. The text is centered over this visualization.

# 3D Visualization of simulated astrophysical plasmas

## ❖ Challenges

1. Plasmas are a continuous spatial distribution of matter  
⇒ Objects of interest are often embedded in / surrounded by more gas
2. 3D simulations are often very heavy ⇒ 3D rendering requires large amounts of RAM memory
3. Works best when interactive, so how to produce publishable 3D figures in articles?

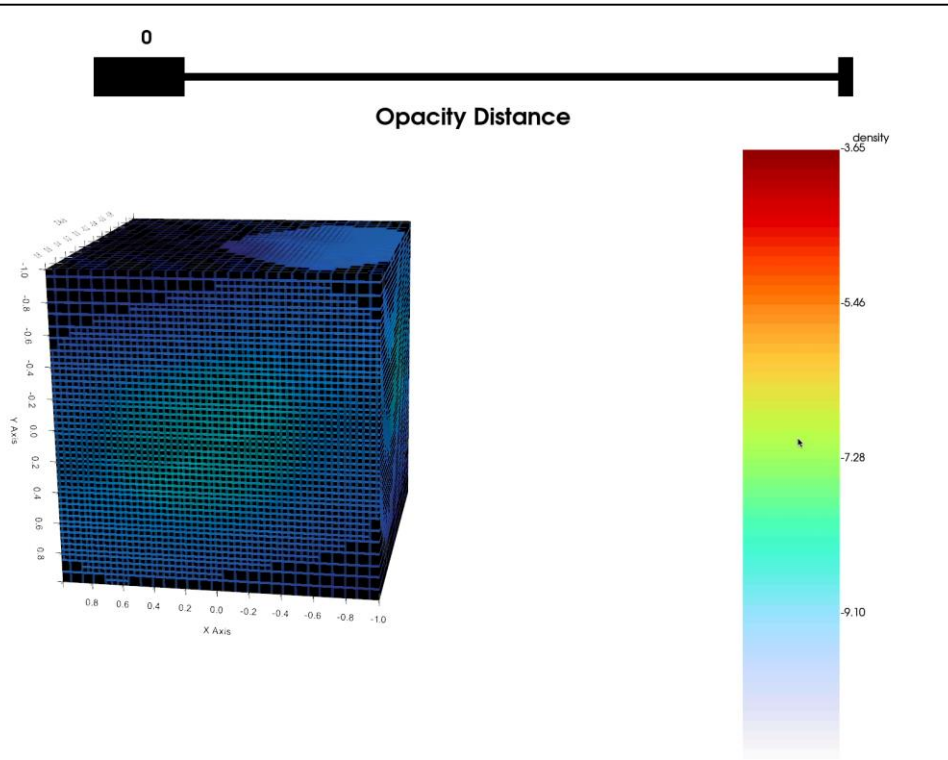
## ❖ Techniques I will cover

1. Volume rendering
2. Iso-contouring
3. 3D streamlines

# Volume rendering

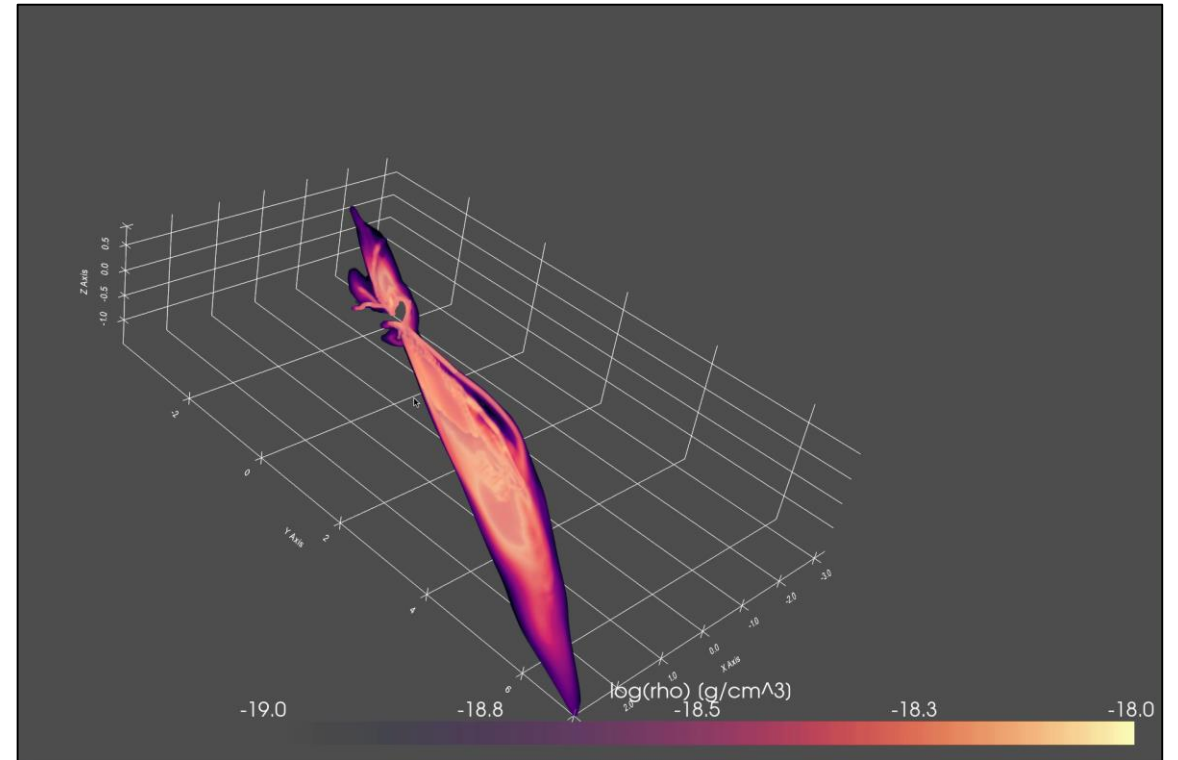
## Protoplanetary disk visualization

Full volume render with linear opacity



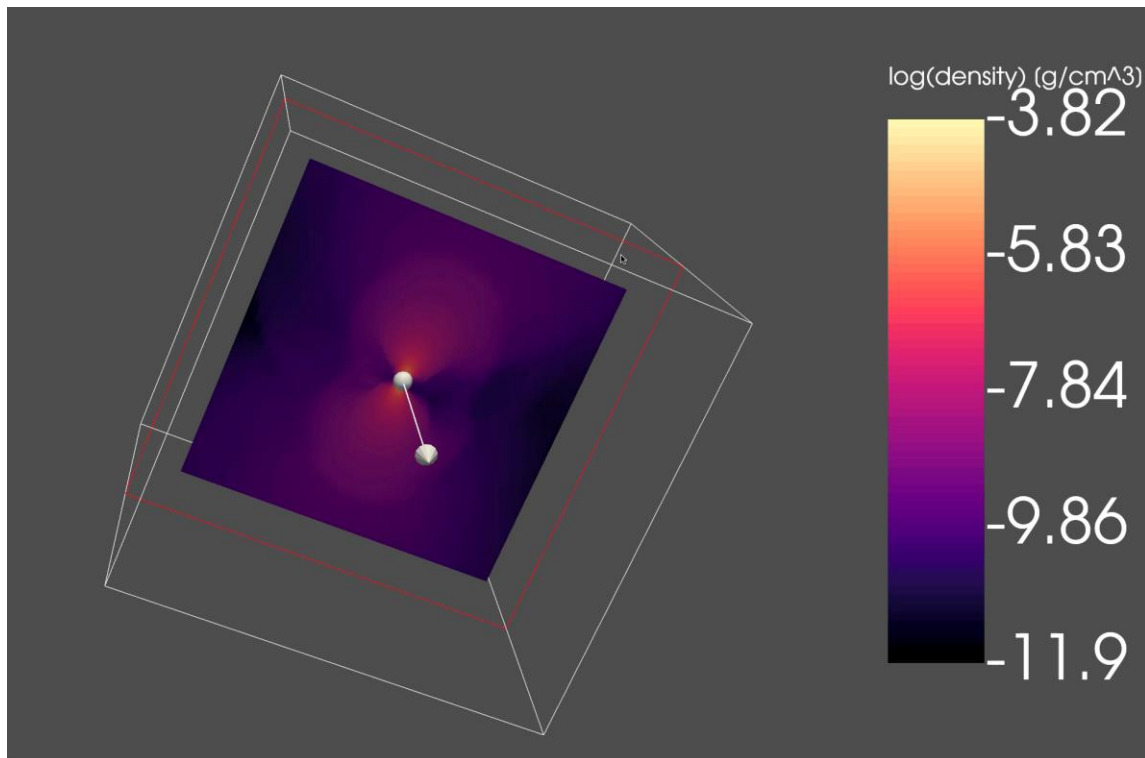
## Molecular cloud filament

ROI render

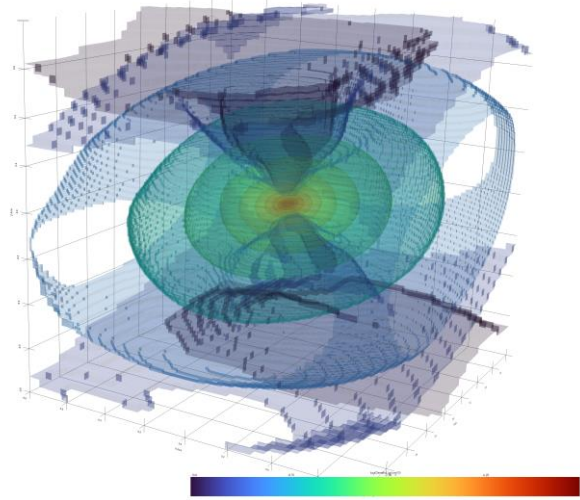


# Volume rendering

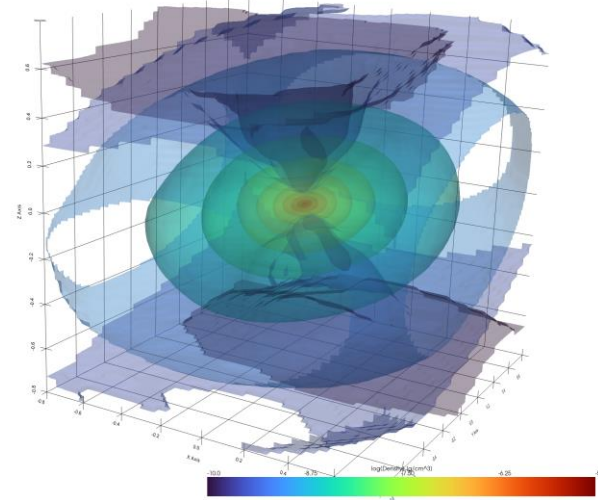
## Mesh clipping/slicing



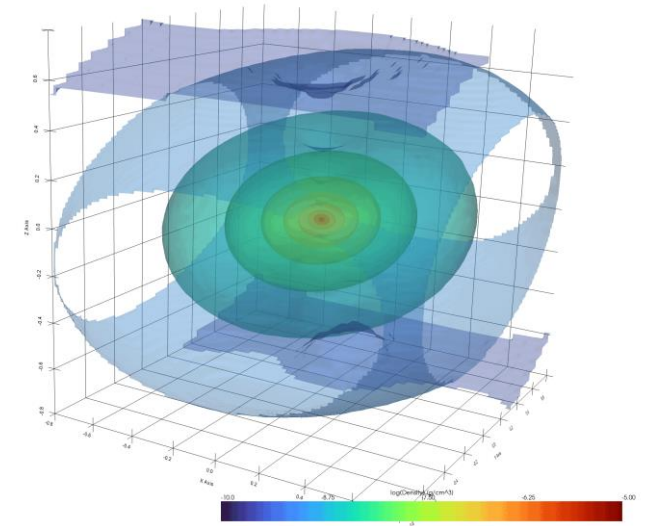
# Iso-contouring



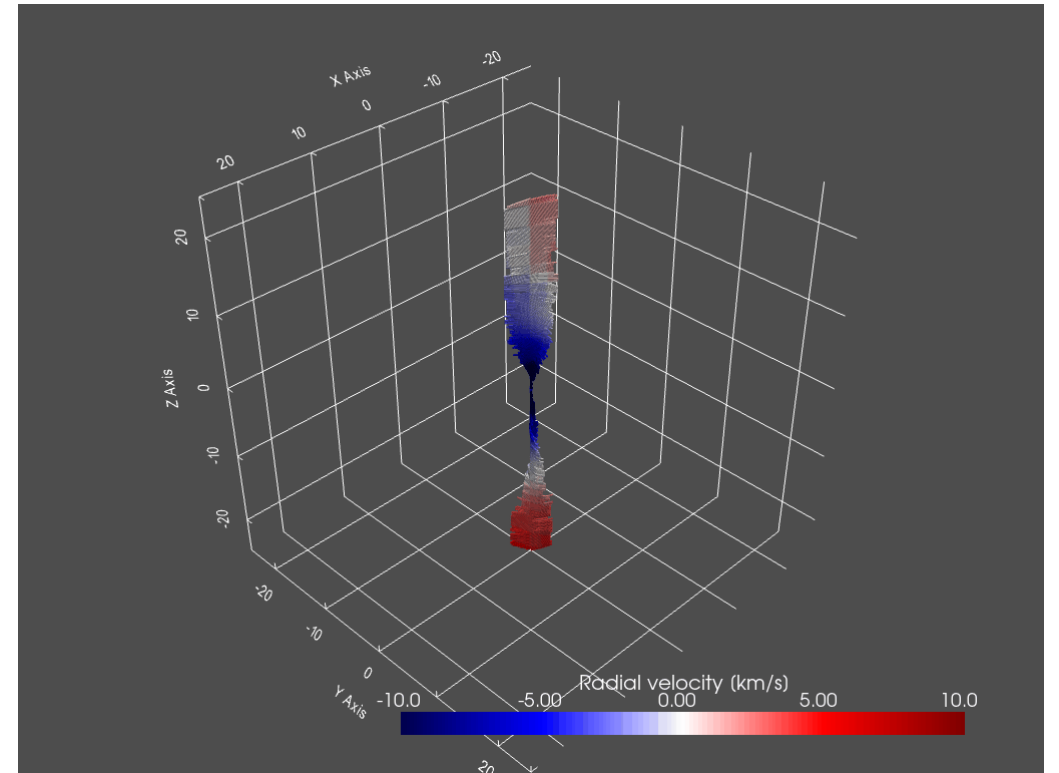
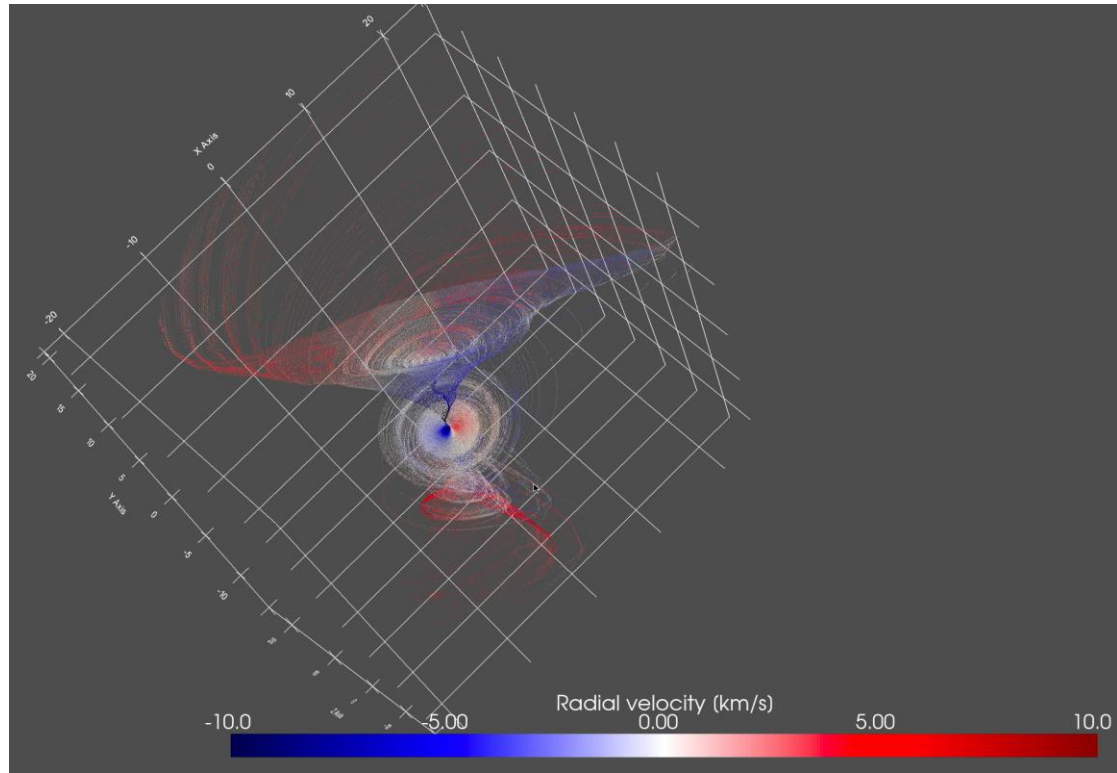
Surface smoothing



Animating

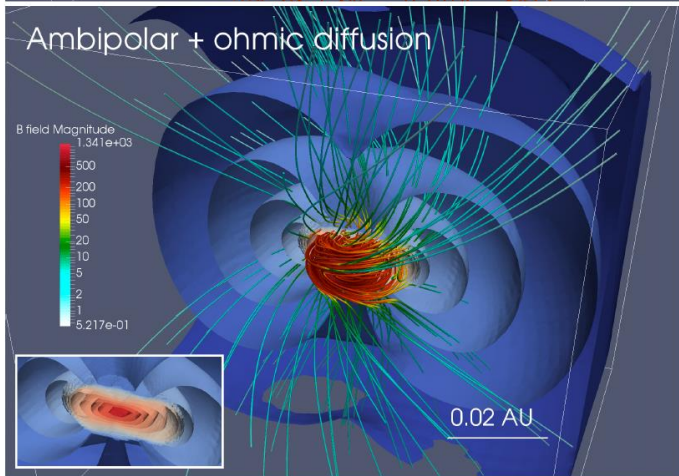
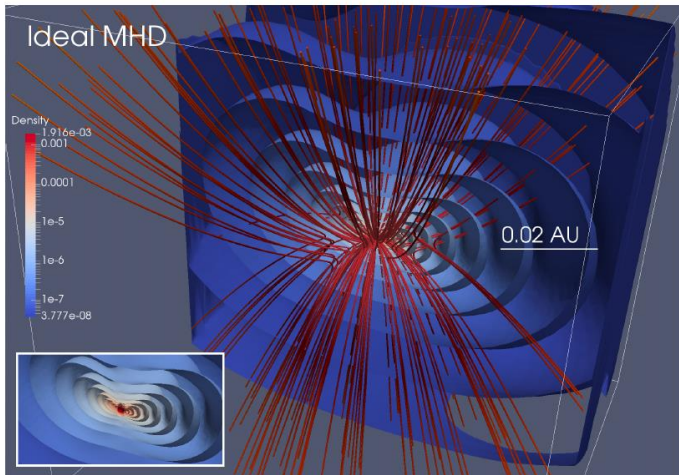


# Streamlines

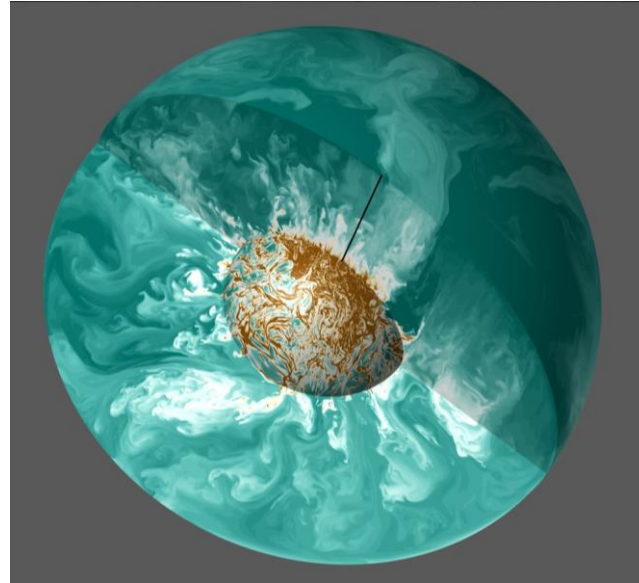


# Published 3D figures examples

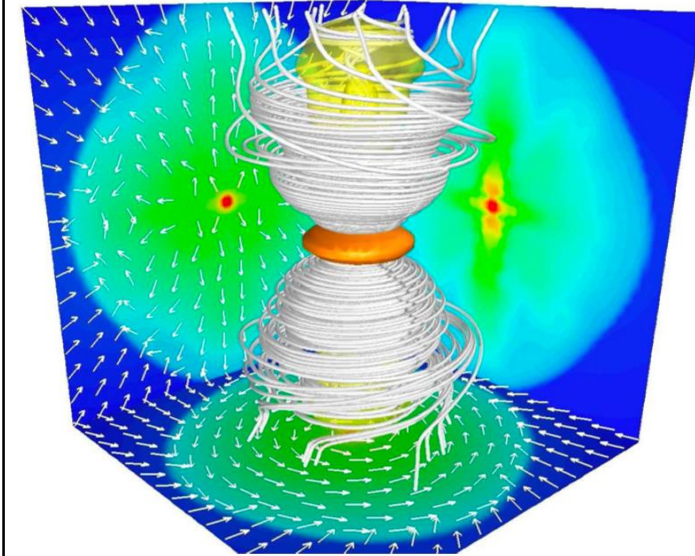
Vaytet+ 2018



Aubert+ 2019



Tomida+ 2013



Seifried+ 2020

