

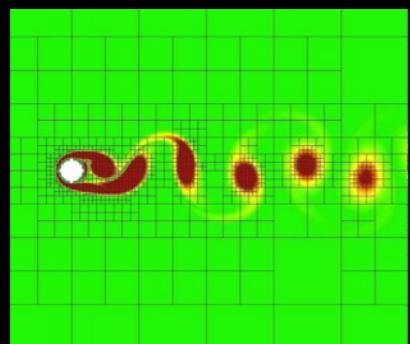
A Few Fun Viz Things You Can Do with yt

Jill P. Naiman
NSF+ITC Fellow, CfA

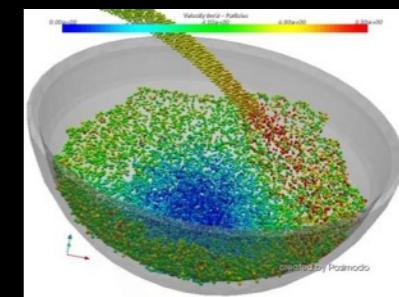
Collaborators: Matthew Turk, Kalina Borkiewicz, A.J. Christensen, Donna Cox, Stuart Levy, Bob Patterson, Jeffrey Carpenter

Workflow of a Typical Computational Astrophysicist

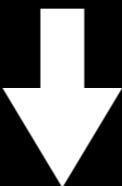
(AMR)



(SPH)



Pick a code for your physics problem.



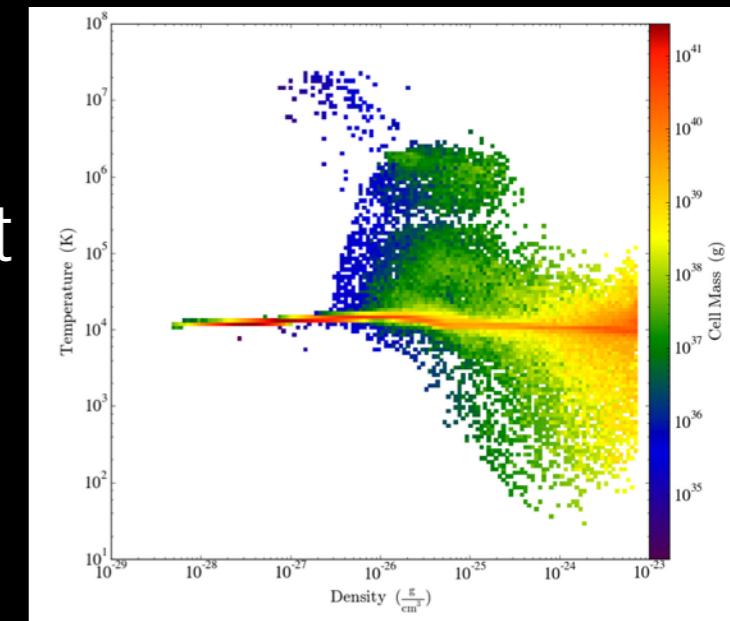
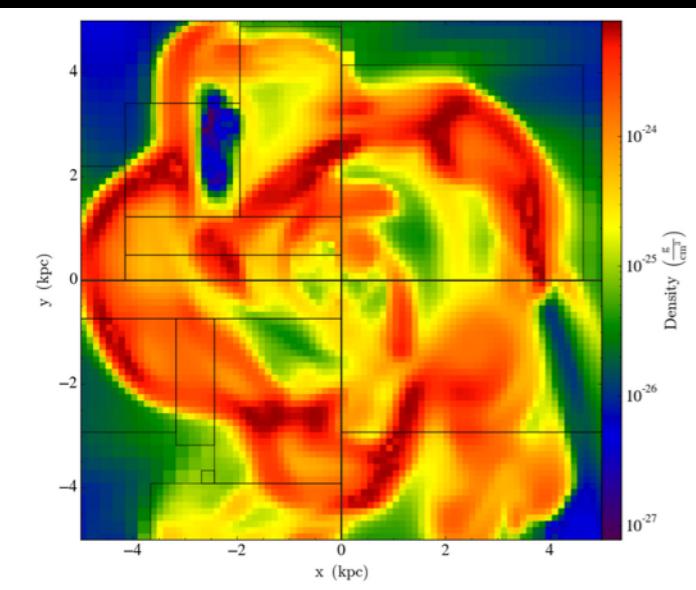
Add physics: (how stars form, supernovae feedback, how elements are created/destroyed, sources of material/heat external to your simulation domain...)



Send to supercomputer... and wait



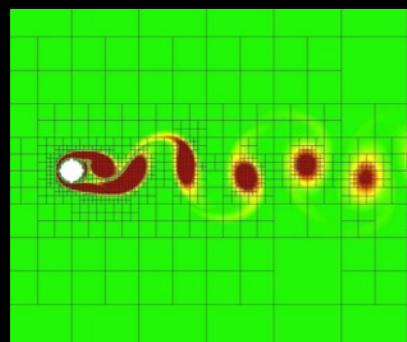
Visualize and Analyze



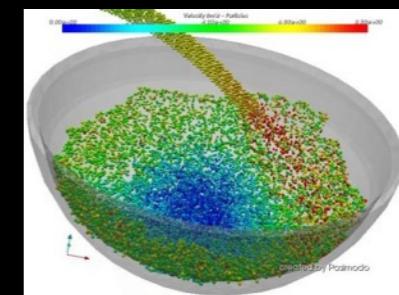
Usually special program for the specific AMR/SPH code, or **yt**

Workflow of a Typical Computational Astrophysicist

(AMR)

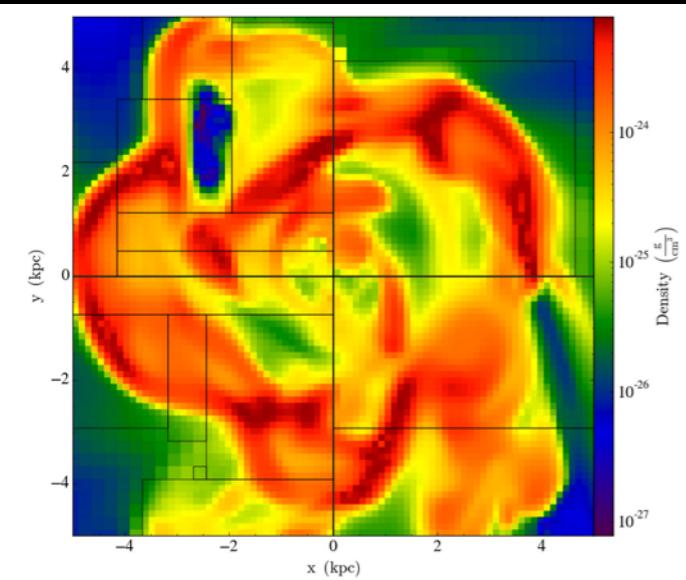


(SPH)

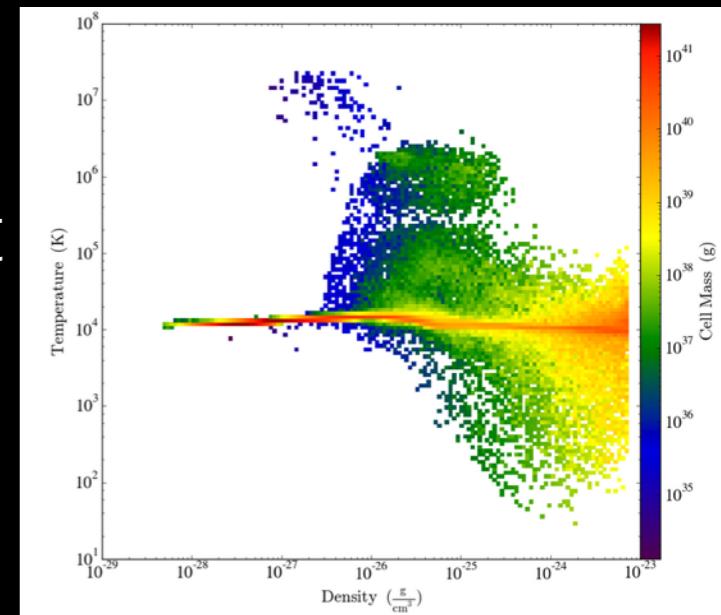


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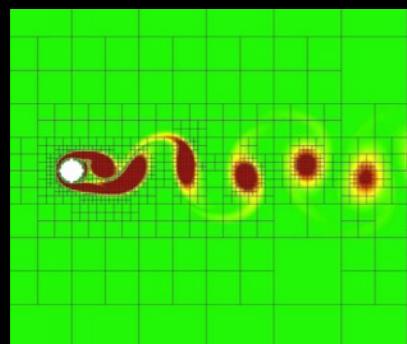


Visualize and Analyze

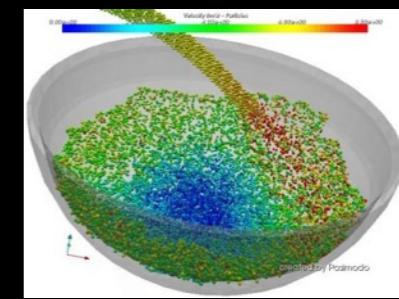
Make a super cool movie

Workflow of a Typical Computational Astrophysicist

(AMR)



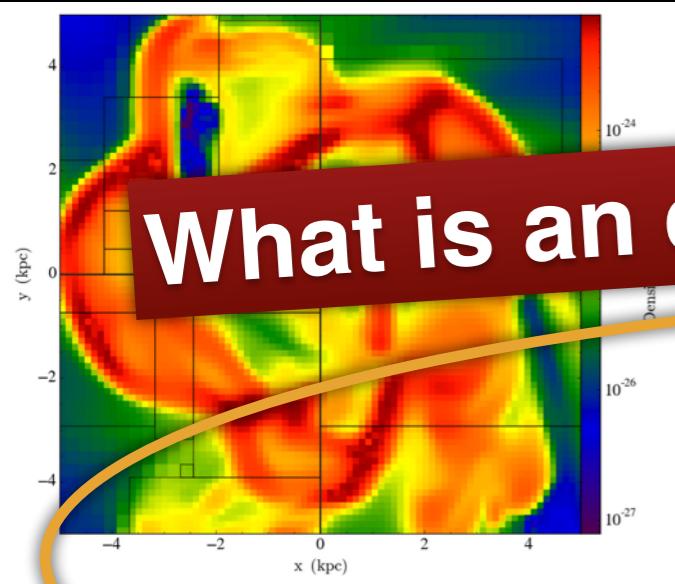
(SPH)



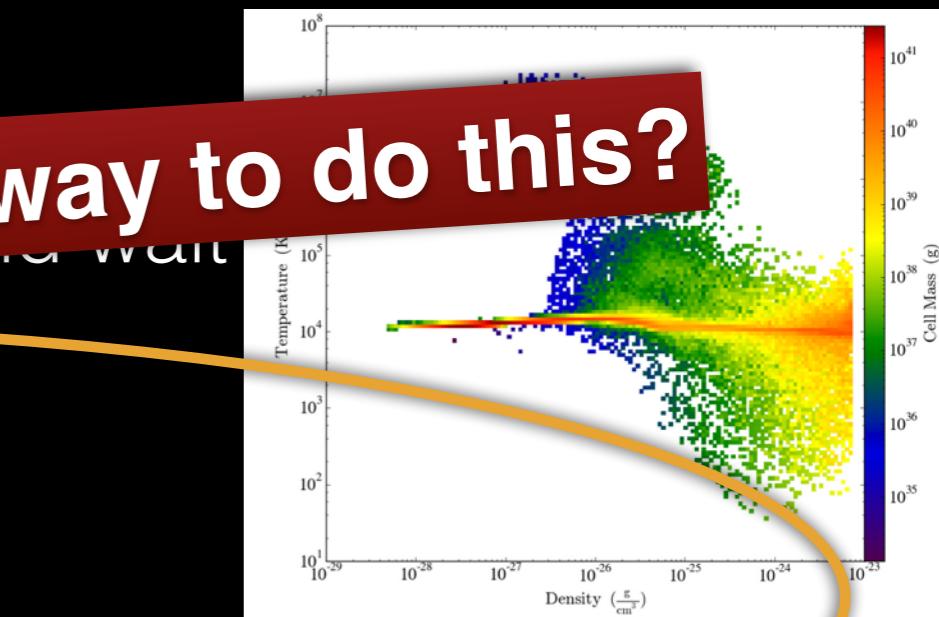
Pick a code for your physics problem.

Add physics: (how stars form, supernovae feedback, how elements are created/destroyed, sources of material/heat external to your simulation domain...)

What is an effective and intuitive way to do this?

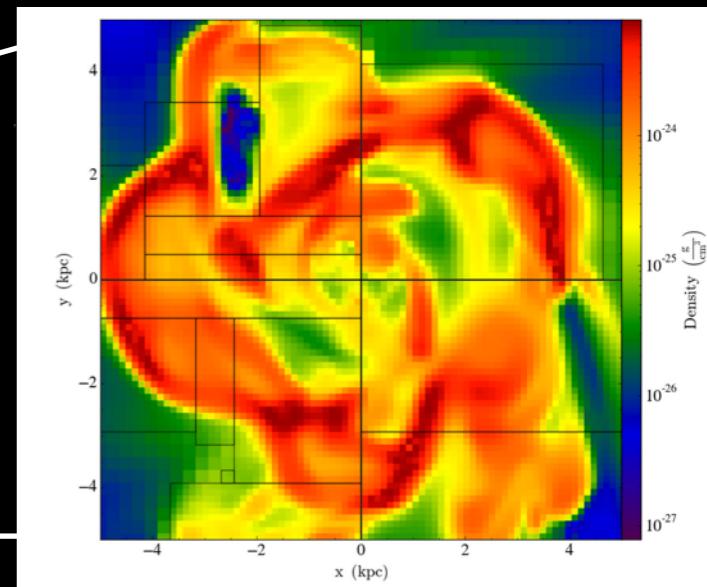
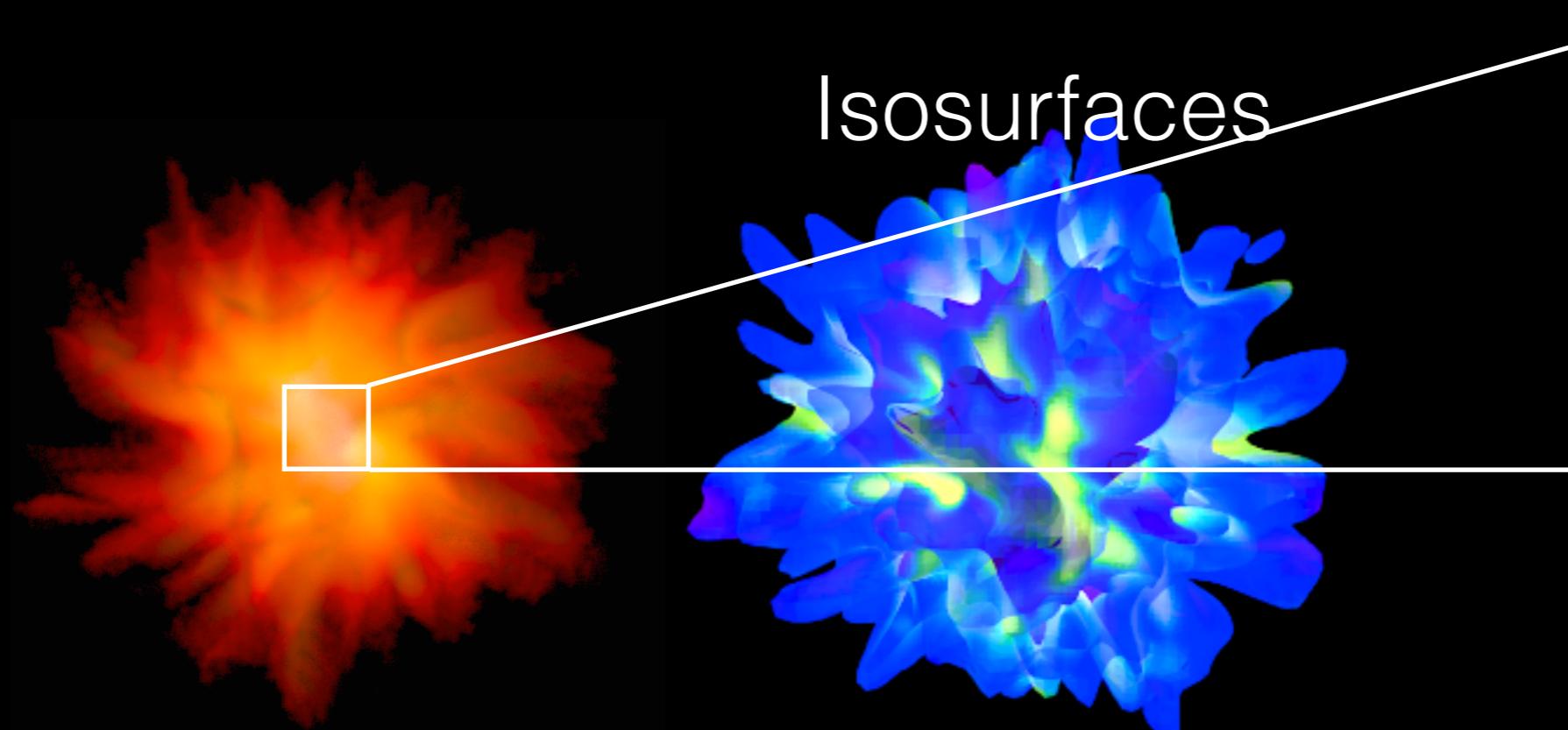


Visualize and Analyze



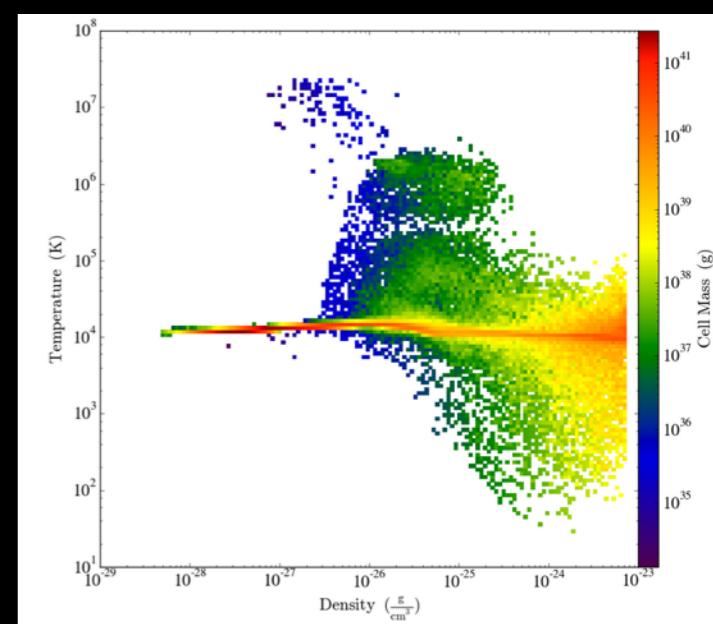
Make a super cool movie

Searching for Fast, Intuitive, Open Access Visualization in the Land of Big Datasets



Requirements to implementing this workflow

- low latency
- fast access to remote data
- both stunning visuals AND analysis capabilities



Ease of handing data over to large studios vs. giving early career scientists tools for their own visualization tools.

Combining Visualization and Analysis

... where we are

Viz and analysis packages written for scientists

IDL

yt

astropy

VisIt

ParaView

Vapor

Glue

Misc Python packages

(I'm sure I'm missing your
favorite!)



High-end 3D modeling, volume rendering, Visual Effects, etc

Maya

Blender

Houdini

Websites with 3D Capabilities:

Sketchfab

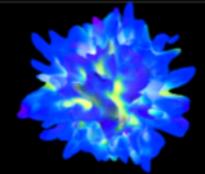
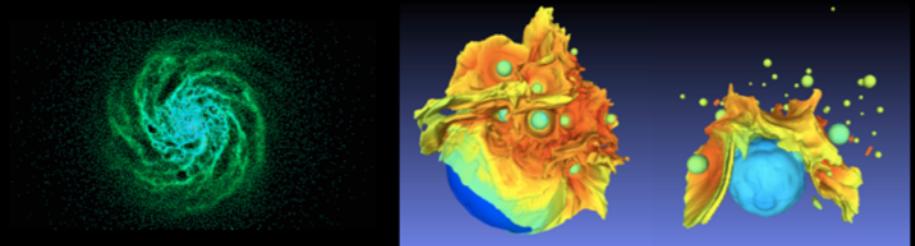
Thingverse

Google Sketchup

Combining Visualization and Analysis

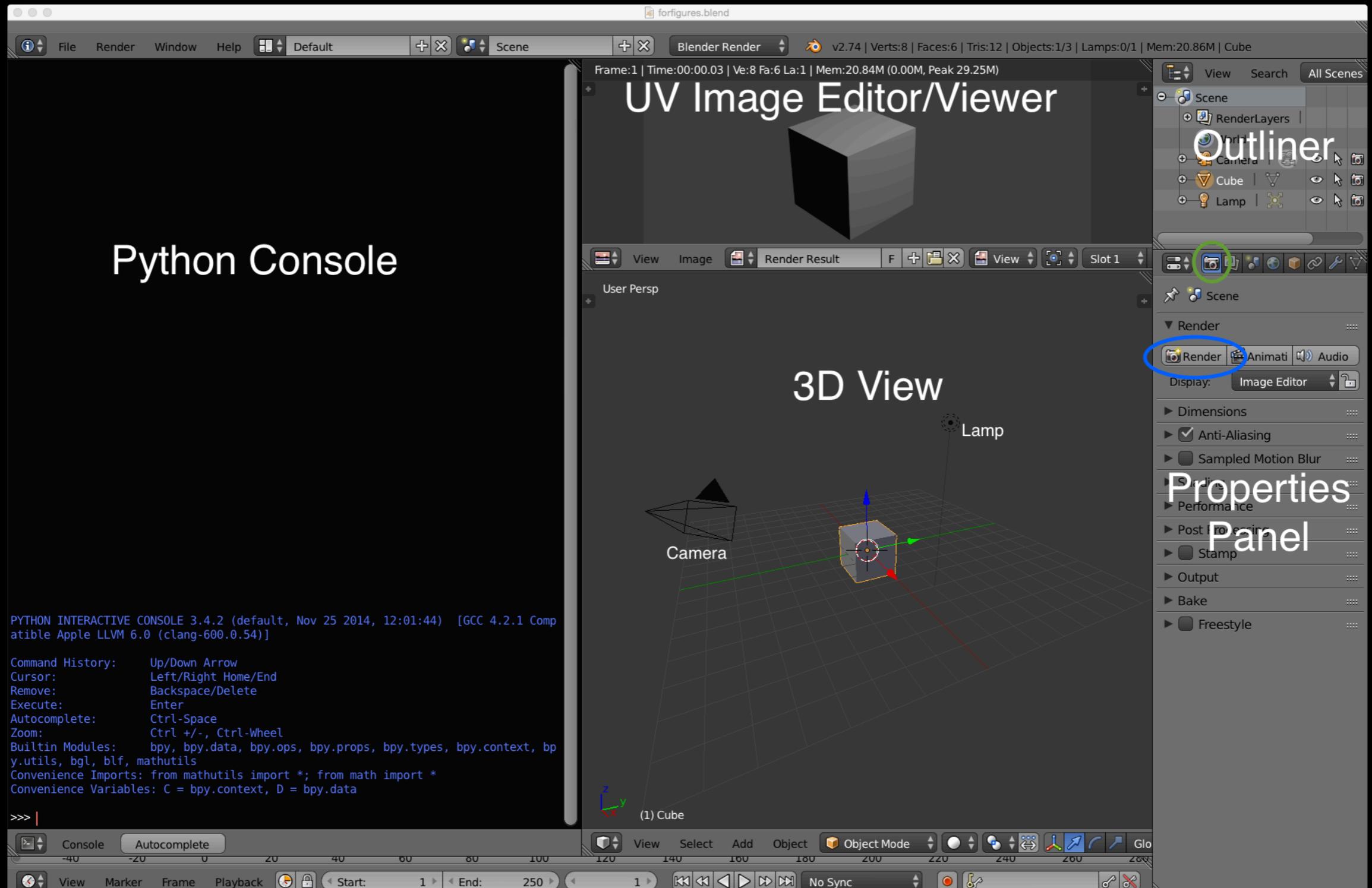
... a collection of fun things as a place to start...

AstroBlend



AstroBlend

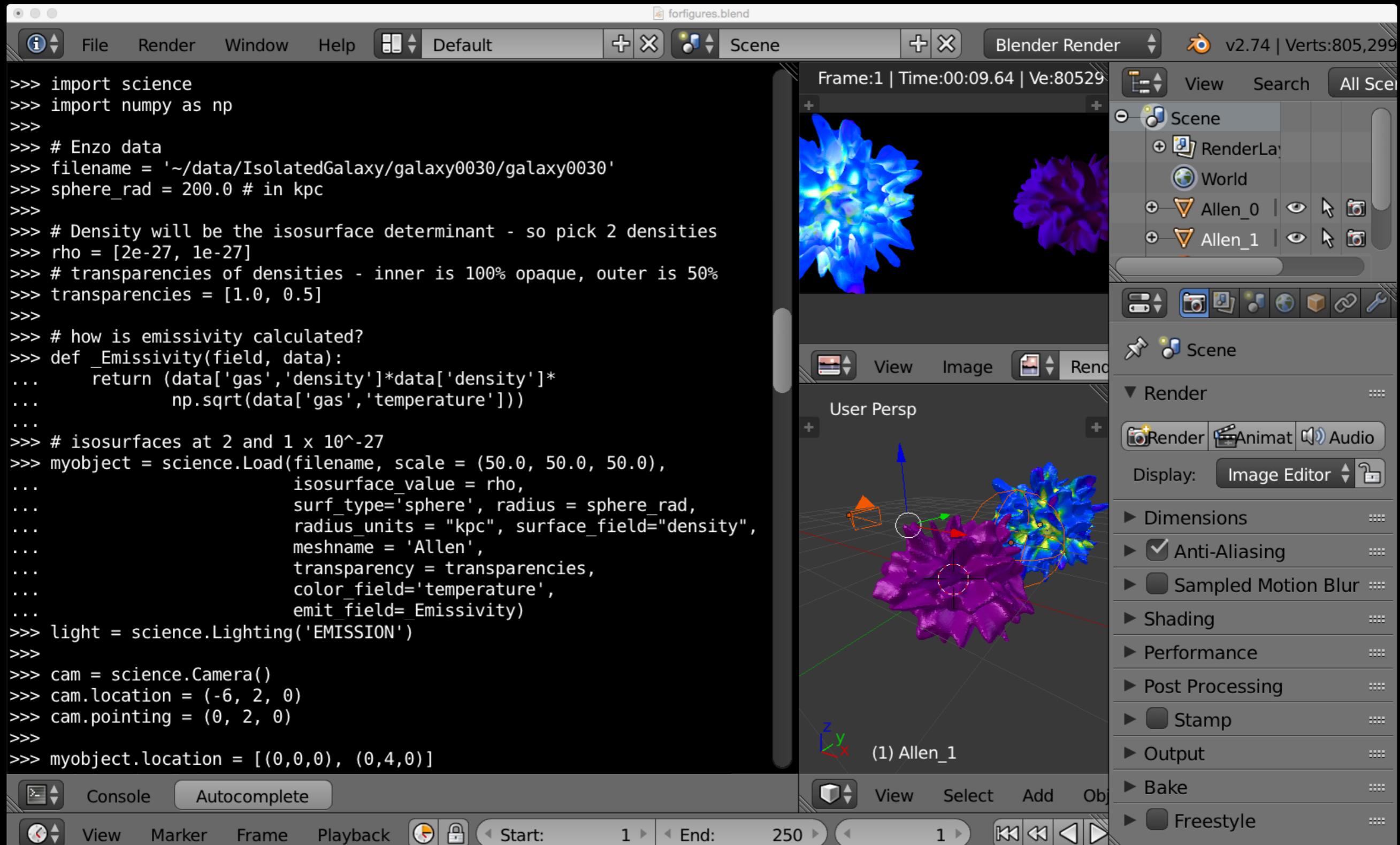
www.astroblend.com



Naiman 2016

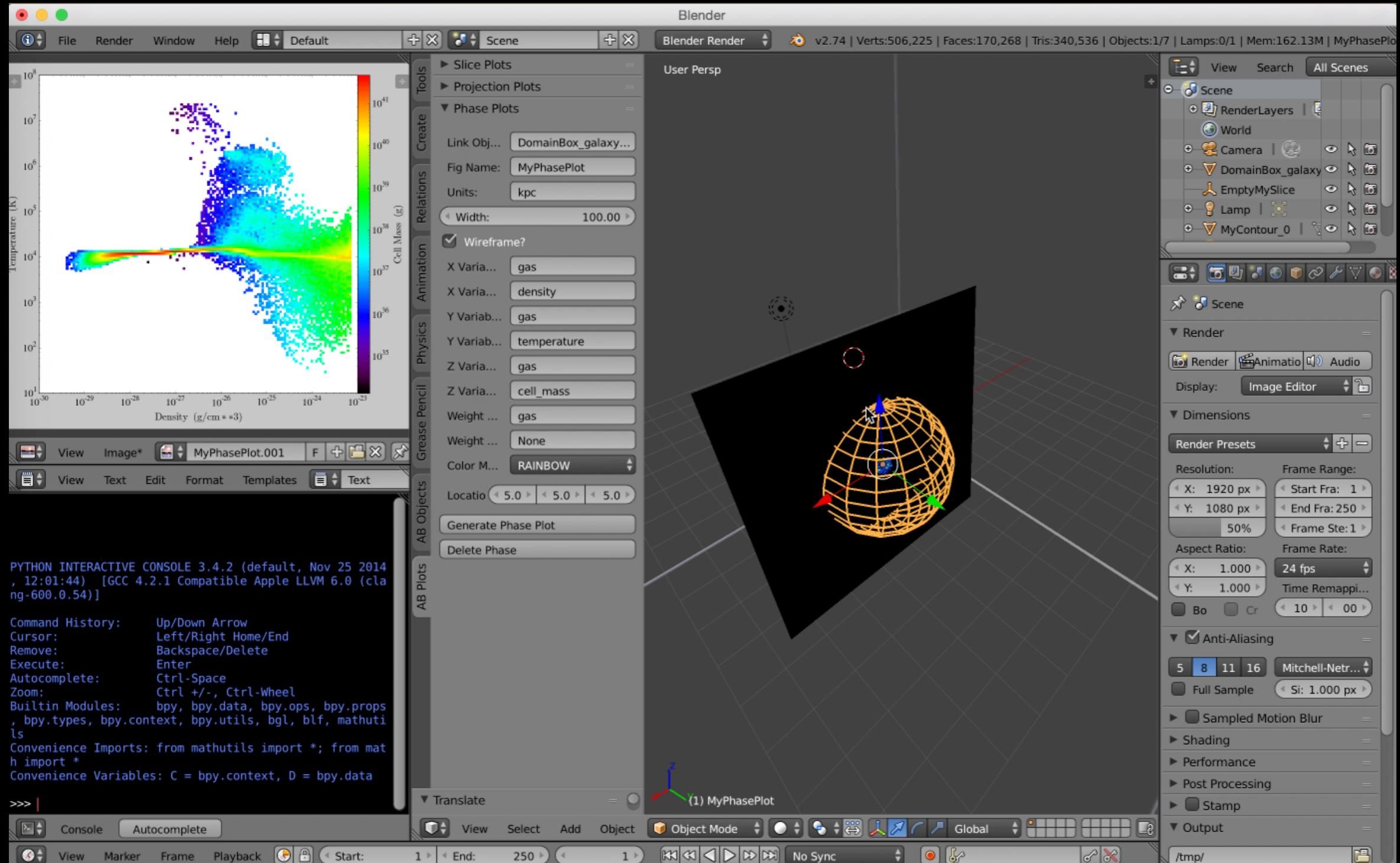
AstroBlend

www.astroblend.com



AstroBlend

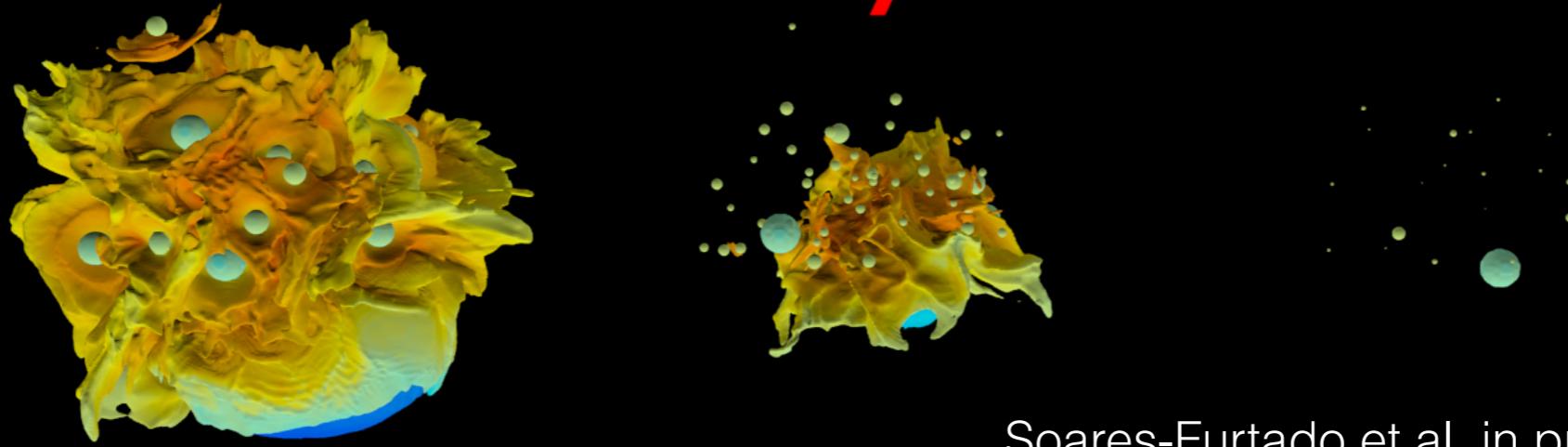
www.astroblend.com



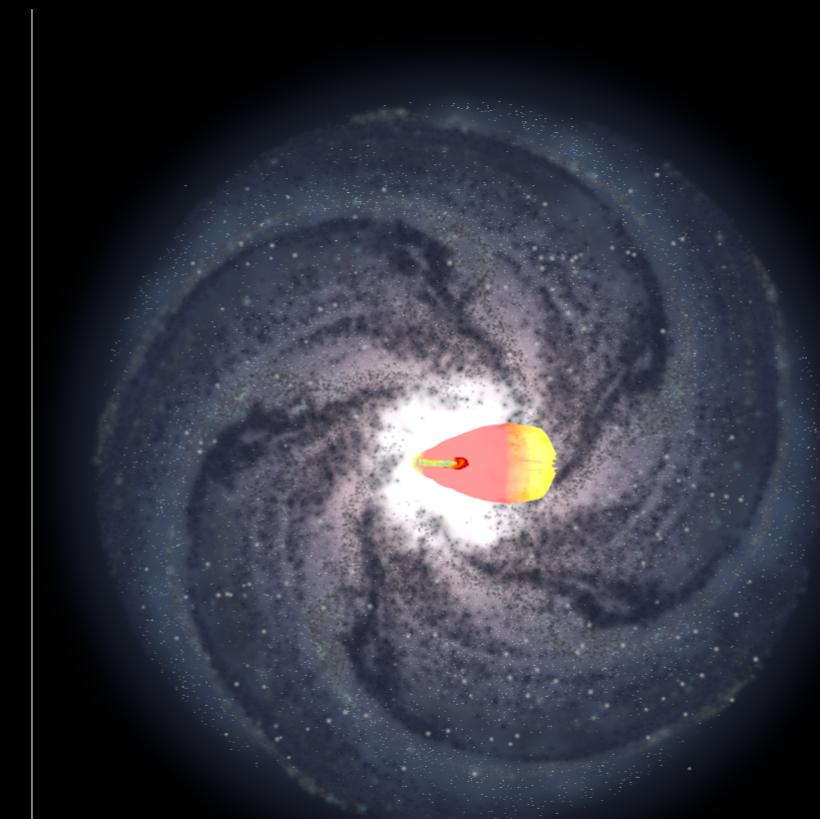
Analysis plots are made to be interactive Naiman 2016

AstroBlend
www.astroblend.com

Density 



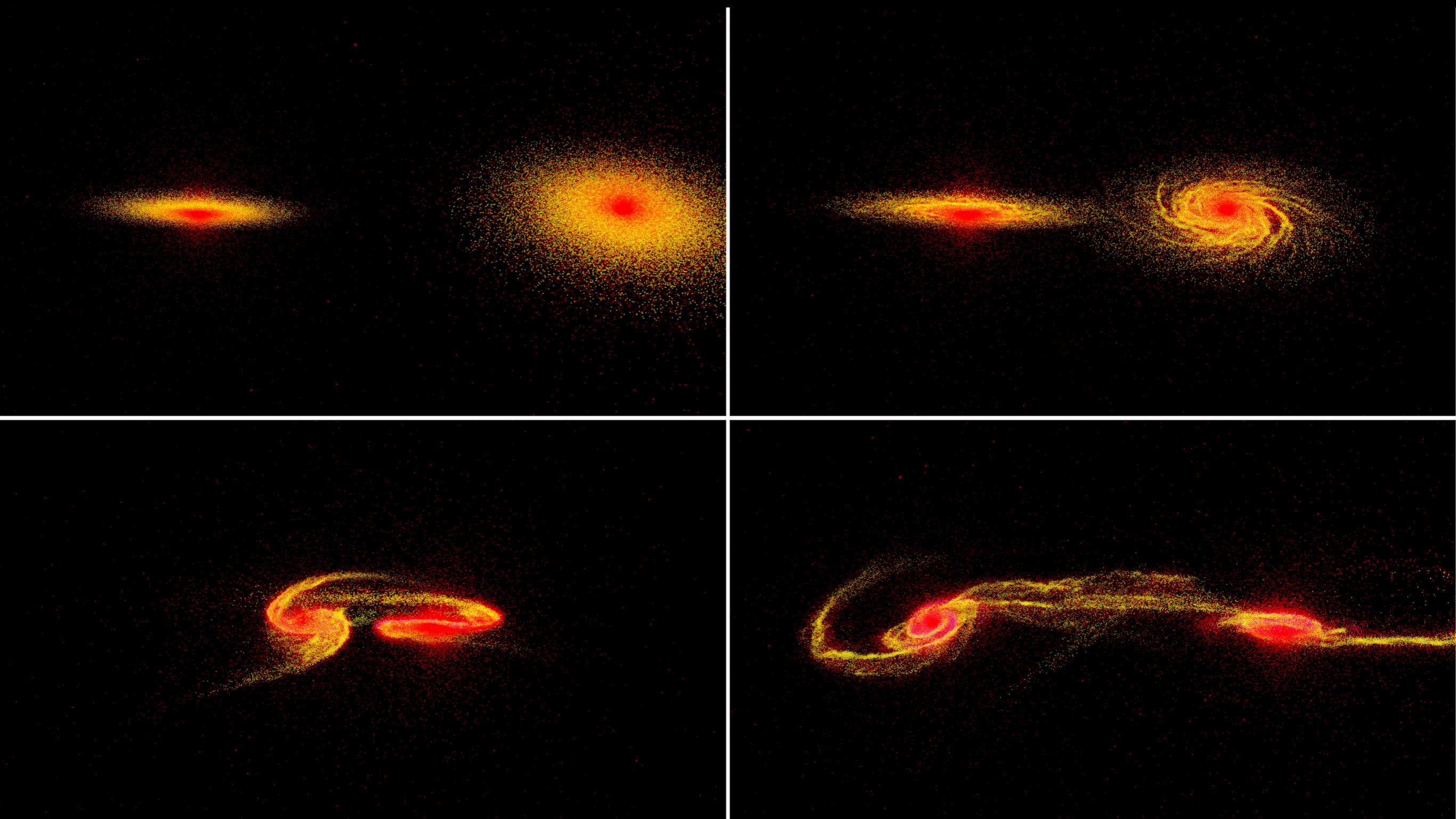
Soares-Furtado et al. in prep



Naiman 2016

AstroBlend

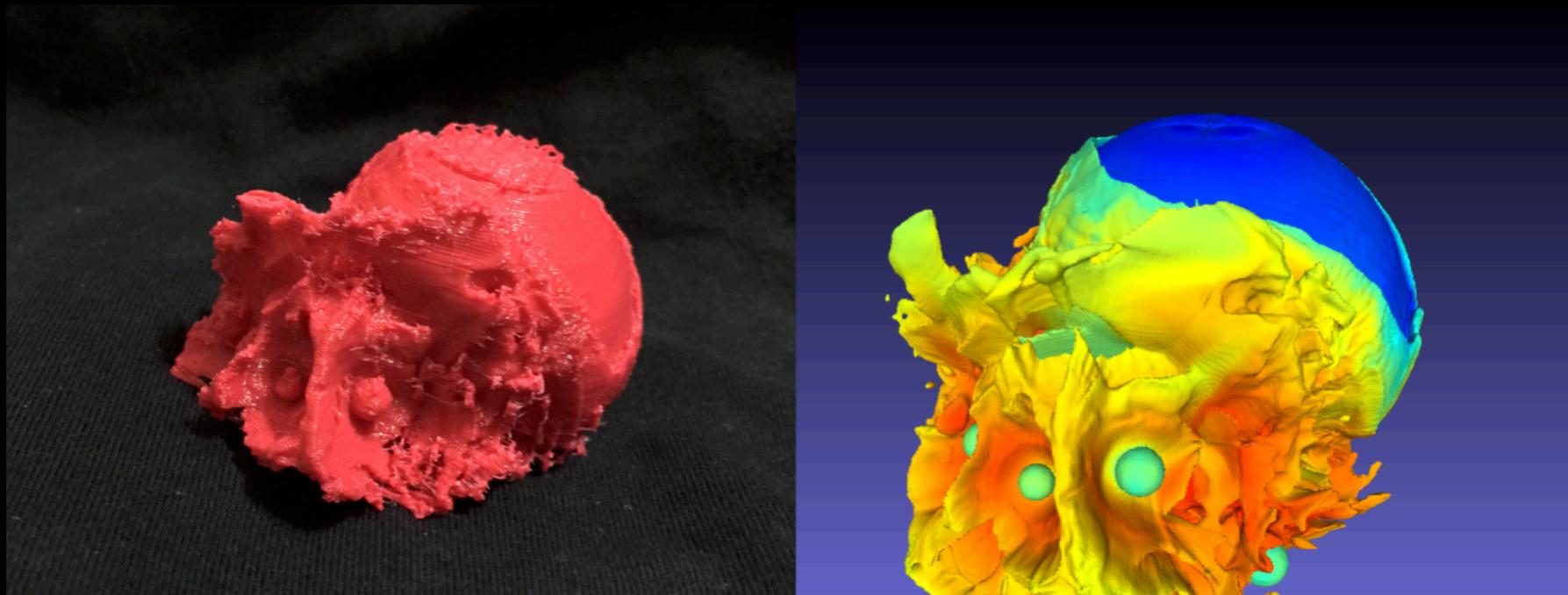
www.astroblend.com



Naiman 2016

AstroBlend

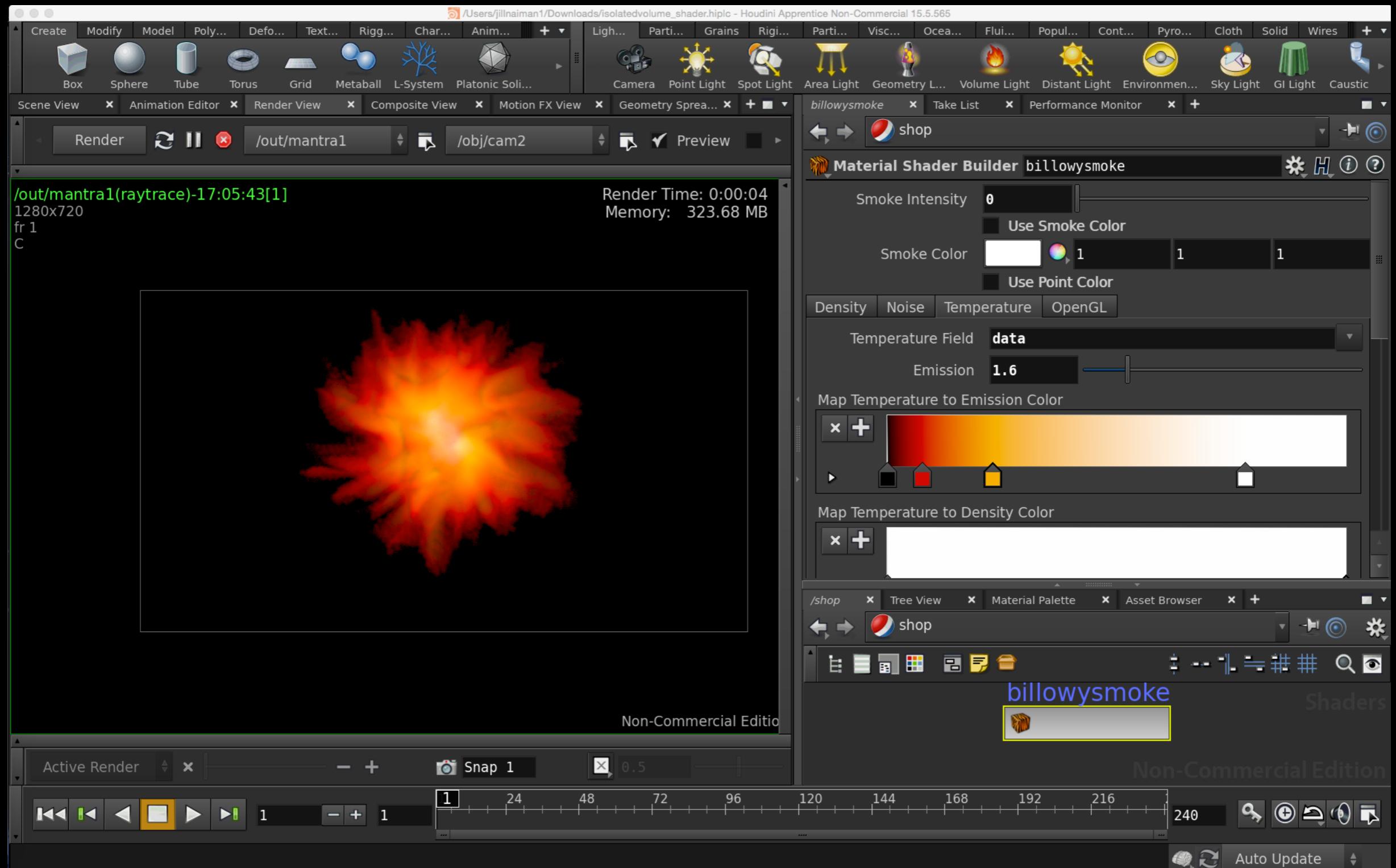
www.astroblend.com



Code, Tutorials, Resources on the website and Bitbucket
Repo

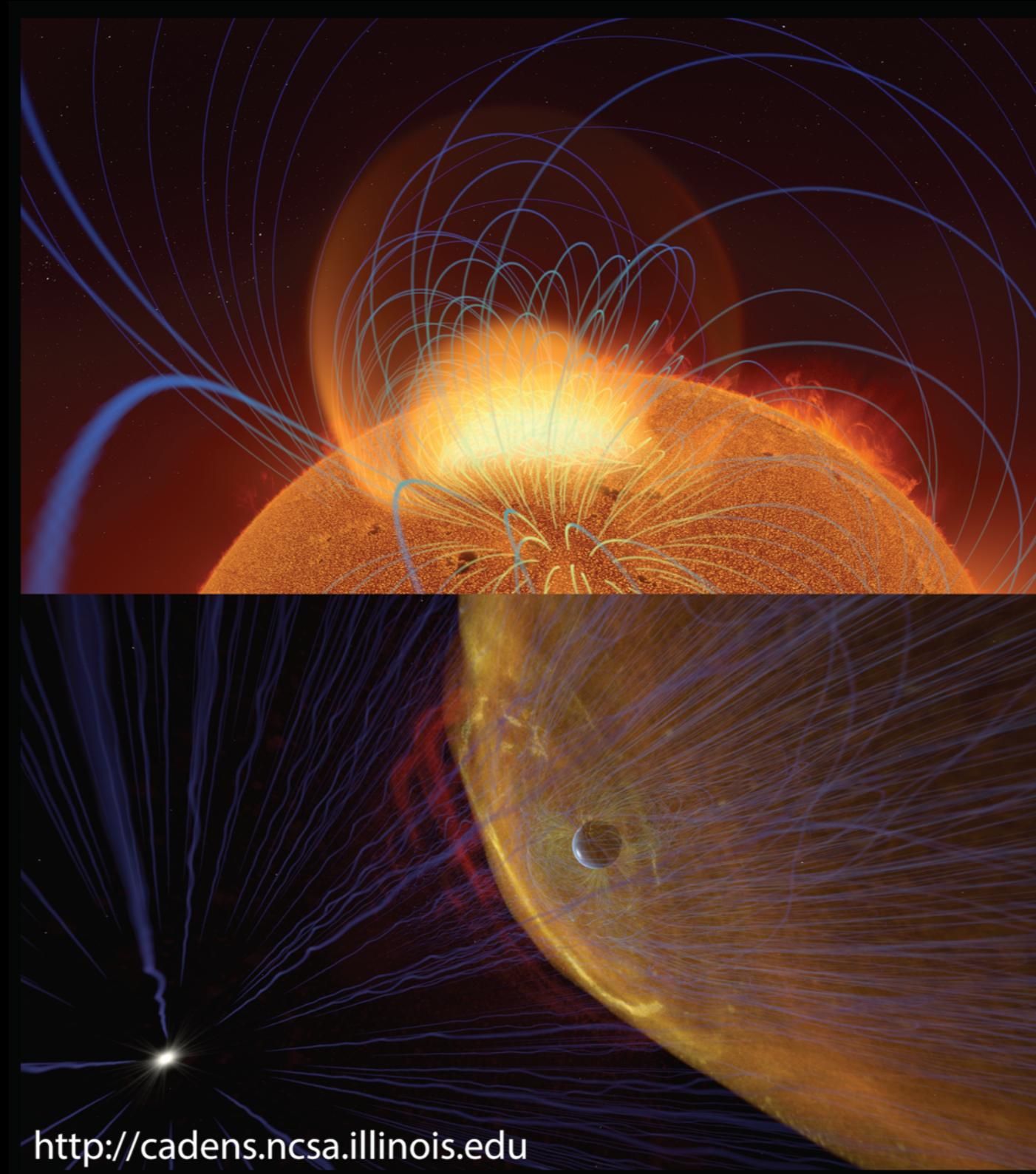
Naiman 2016

Ytini
www.ytini.com



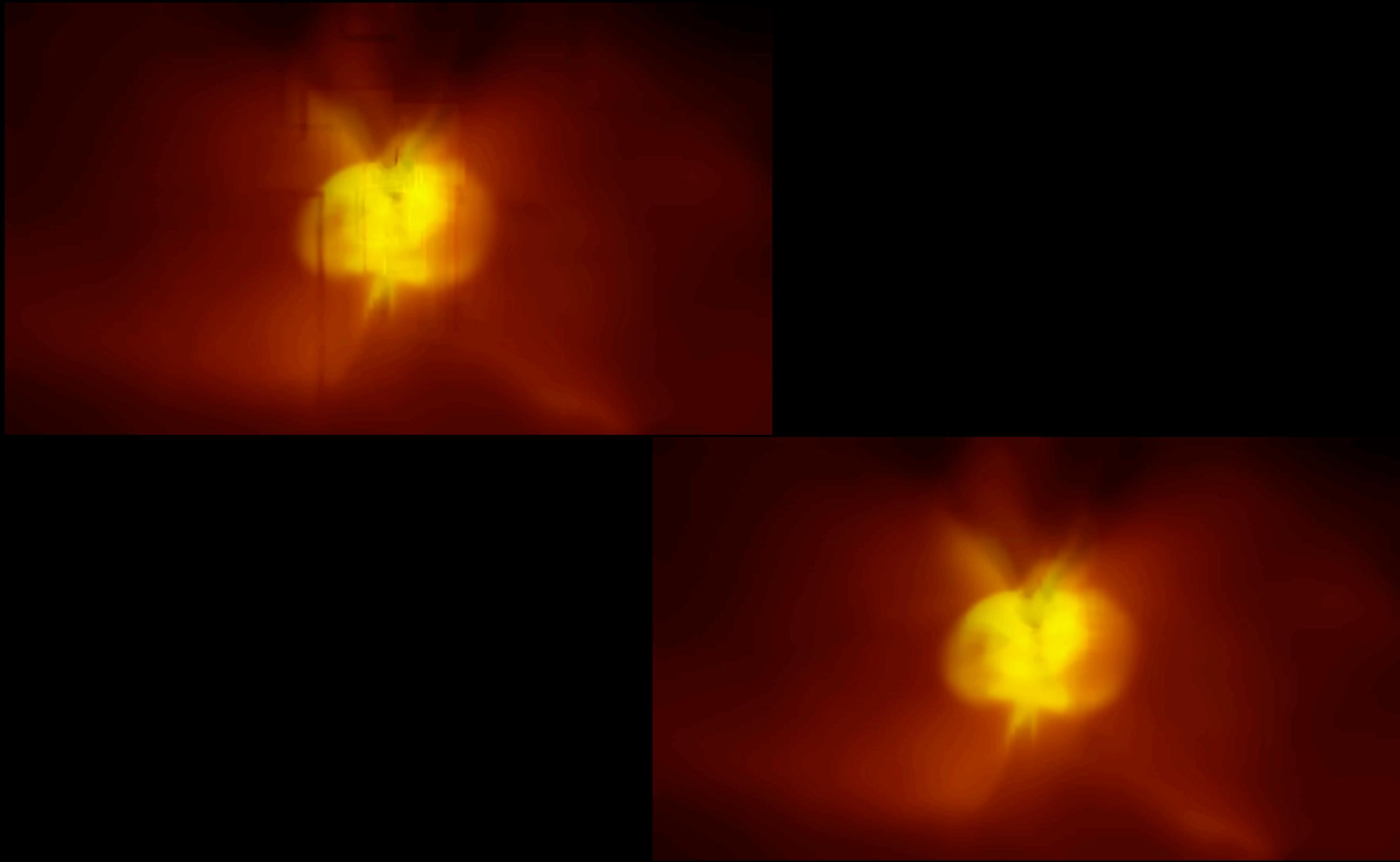
Naiman et al. 2017

Ytini
www.ytini.com



Naiman et al. 2017

Ytini
www.ytini.com



Sketchfab fun with Banneker/Aztlan Institutes

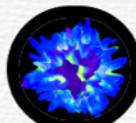
www.astroblend.com/ba2016

Two Weeks of Computational Astro/Viz

Computational Astrophysics and Visualization

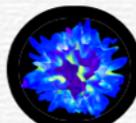
[Home](#) [Days](#) ▾

Day Pages: Astrophysical Visualization



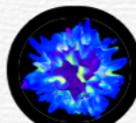
Day 1

Start to think about how to use visualization in your research, make some movies.



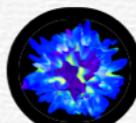
Day 2

Continue making some movies, starting thinking in 3D.



Day 3

Start thinking statically in 3D and start making some movies.

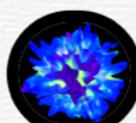


Day 4

A few thoughts to finish up, and resources to look into for more computational astronomy and visualization stuff.

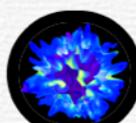
Second week - make 2D and 3D movies of the planetary systems and galaxies

Day Pages: Computational Astrophysics



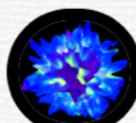
Day 1

Analytical and Numerical Solution of 2-Body Problem.



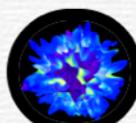
Day 2

More on the 2-Body problem.



Day 3

Different solvers, multi-planet systems.



Day 4

The 3rd Dimension! Woo!

First week - calculate orbits of planetary systems and motion of stars in merging galaxies

Two Weeks of Computational Astro/Viz

Moved on to:

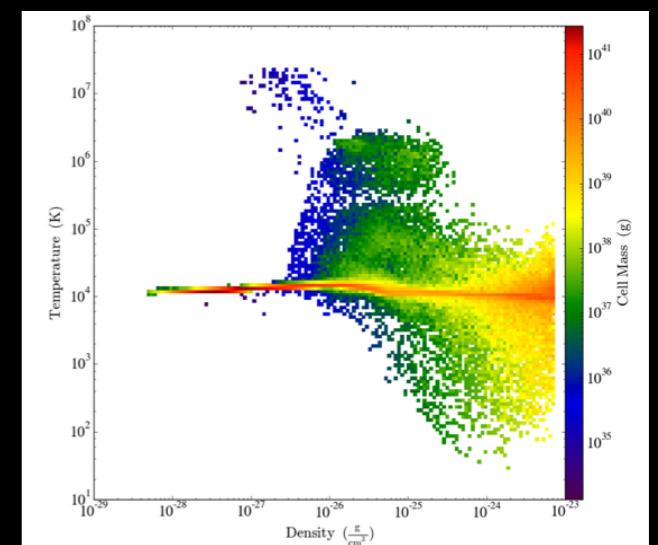
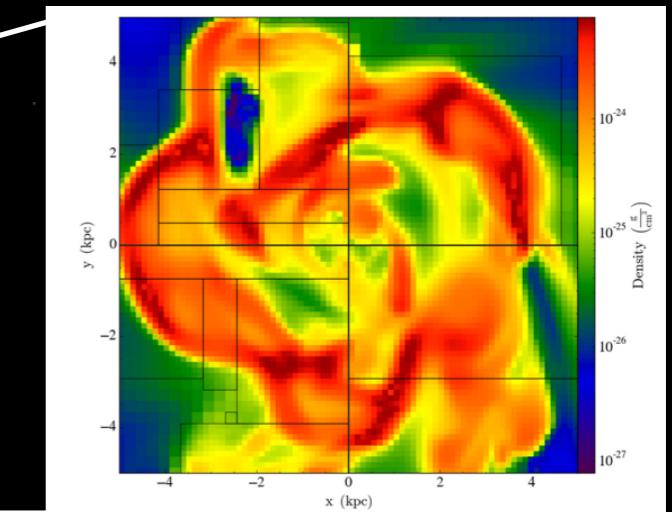
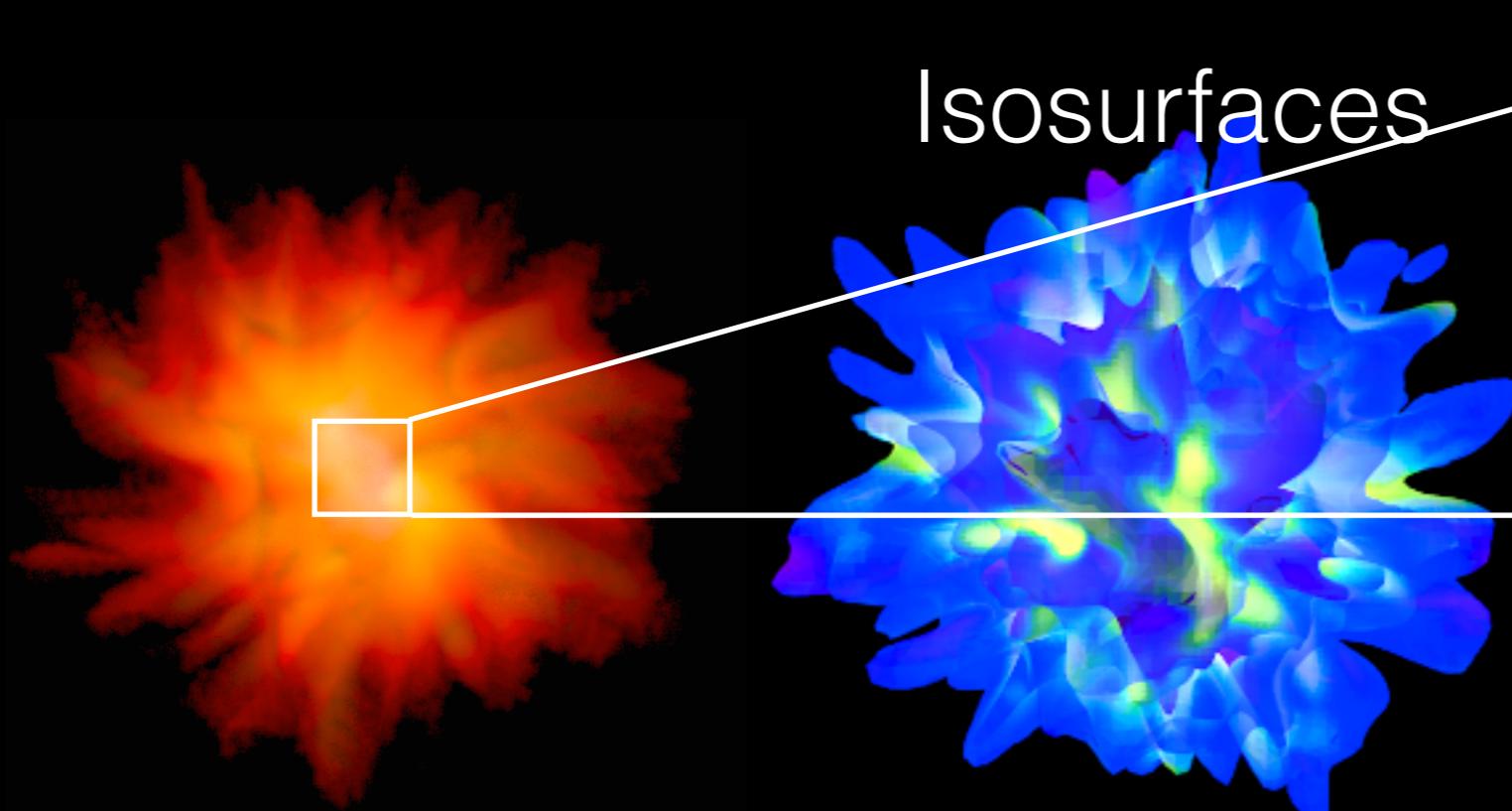
3D Planets <https://skfb.ly/RyZo>

3D Galaxies <https://skfb.ly/QHwx>

Where we go from here

Requirements to implementing this workflow

- low latency ← data preprocessing and AMR capabilities
 - fast access to remote data ← some capabilities in yt to be fully utilized
 - both stunning visuals AND analysis capabilities
- fuller integration of yt into Blender/Houdini (and Glue)



Some Resources

jill.naiman@cfa.harvard.edu

- ◆ www.astroblend.com
- ◆ <http://yt-project.org/>
- ◆ <http://bannekerinstitute.fas.harvard.edu/about>
- ◆ <http://www.ncsa.illinois.edu/>
- ◆ www.sketchfab.com/jnaiman
- ◆ www.ytini.com
- ◆ www.astroblend.com/ba2016