Astrophysical Gas Dynamics

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TODAY:

- *Kelvin-Helmholtz and Rayleigh-Taylor instability (→ recap and finish)*
- *Spherically symmetric stationary flows (Parker wind solution)*

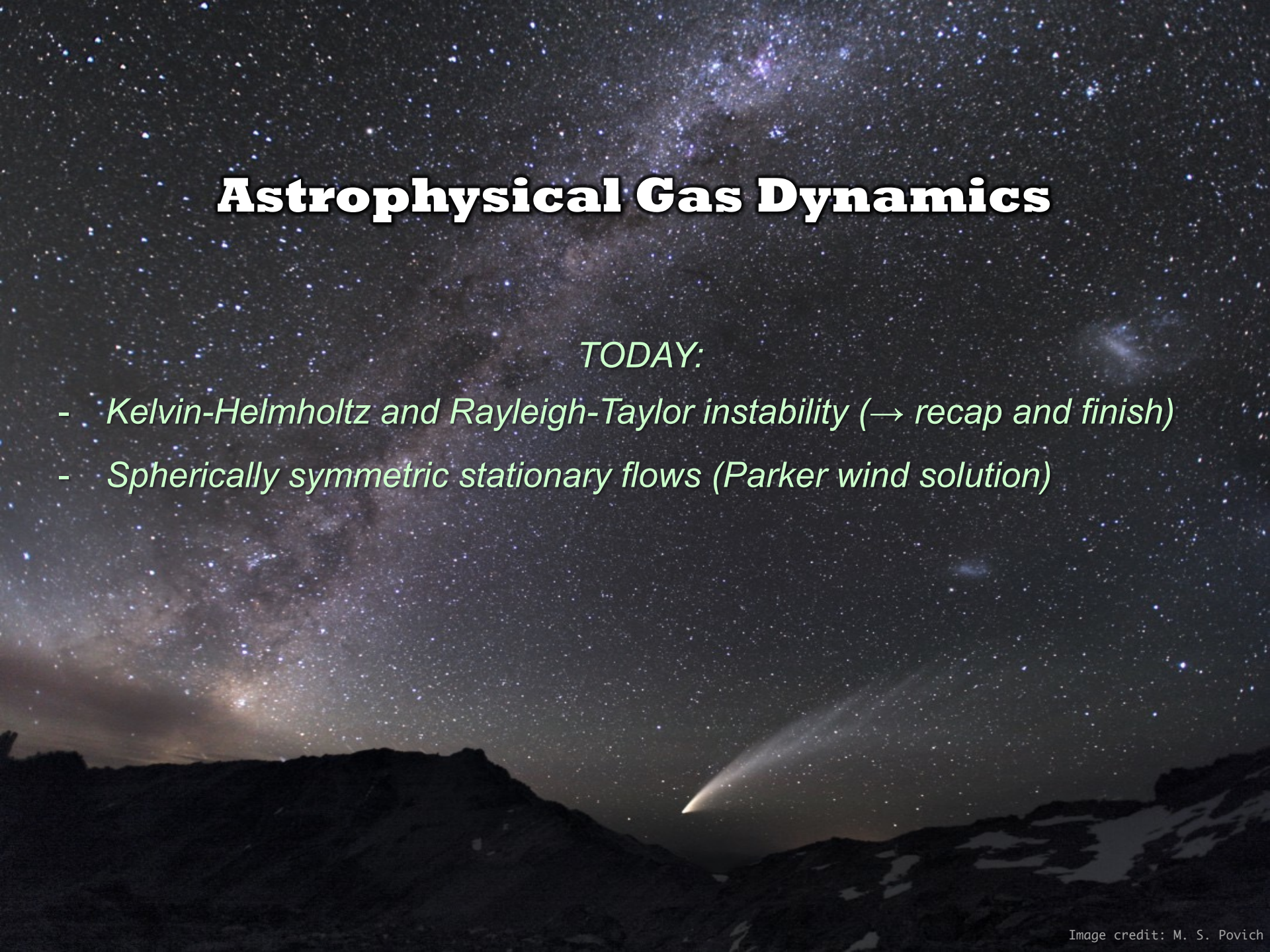

Image credit: M. S. Povich

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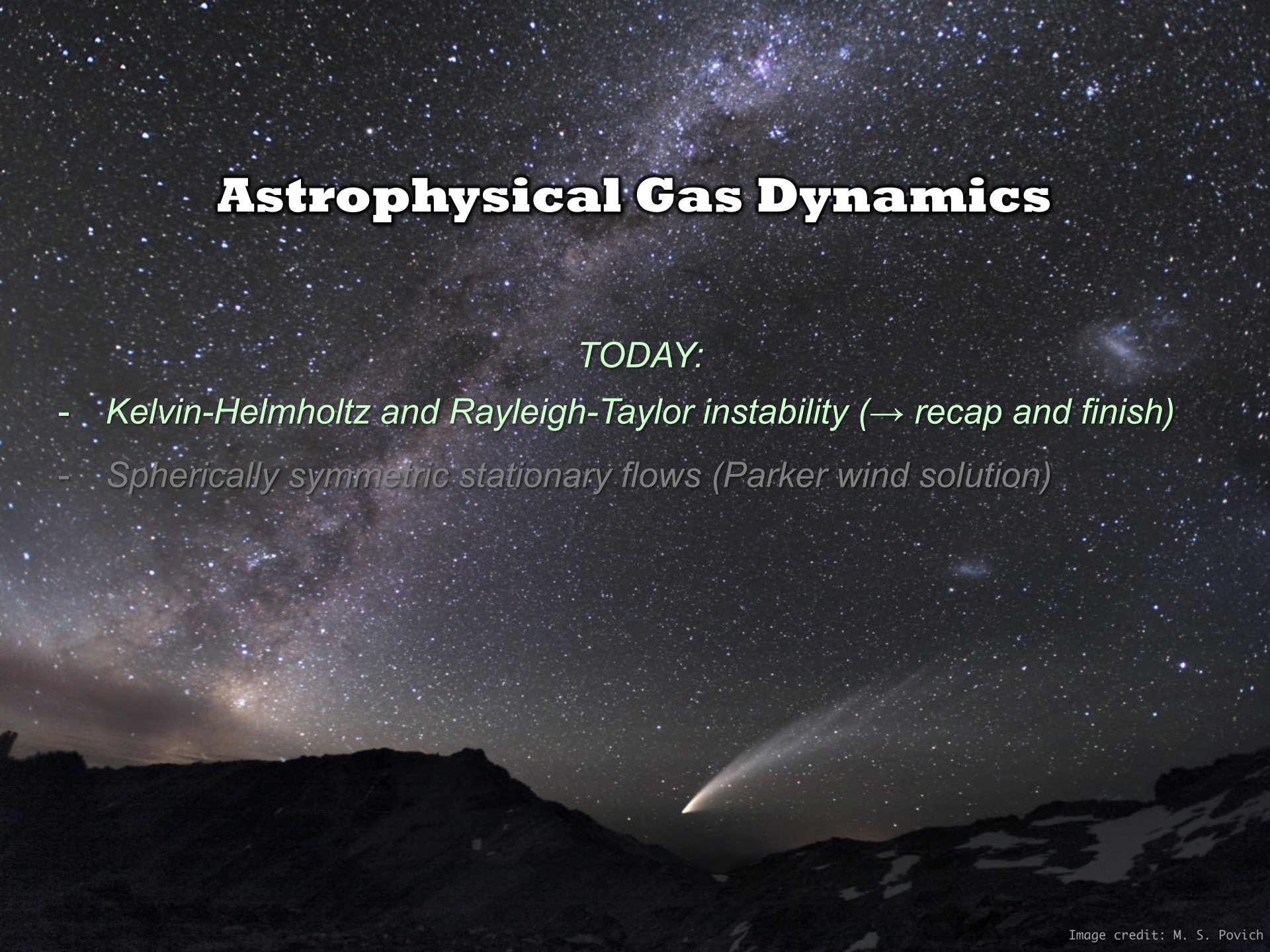
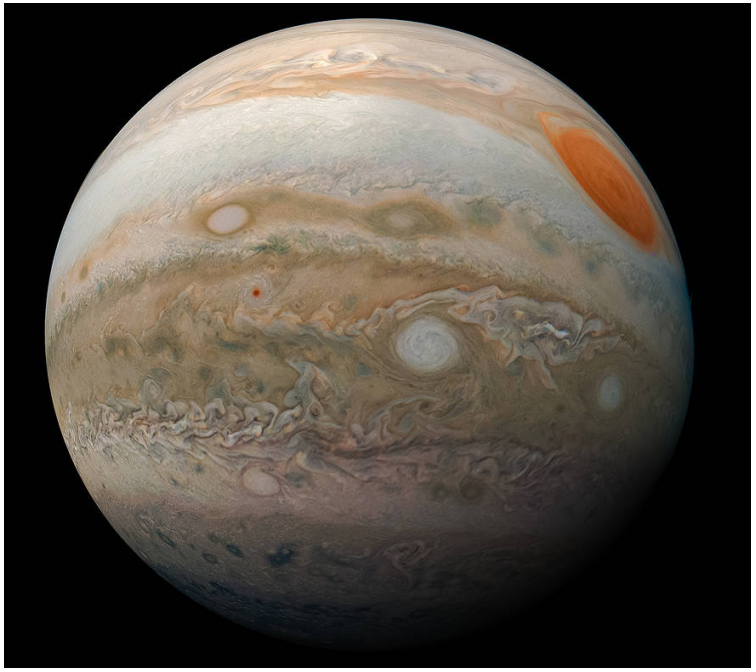


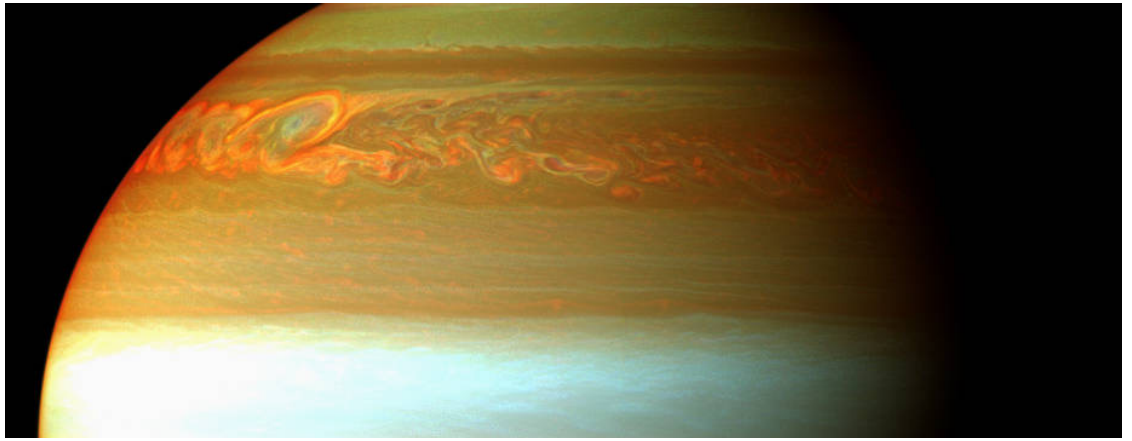
Image credit: M. S. Povich

Kelvin-Helmholtz instability

(clouds)



(Jupiter)

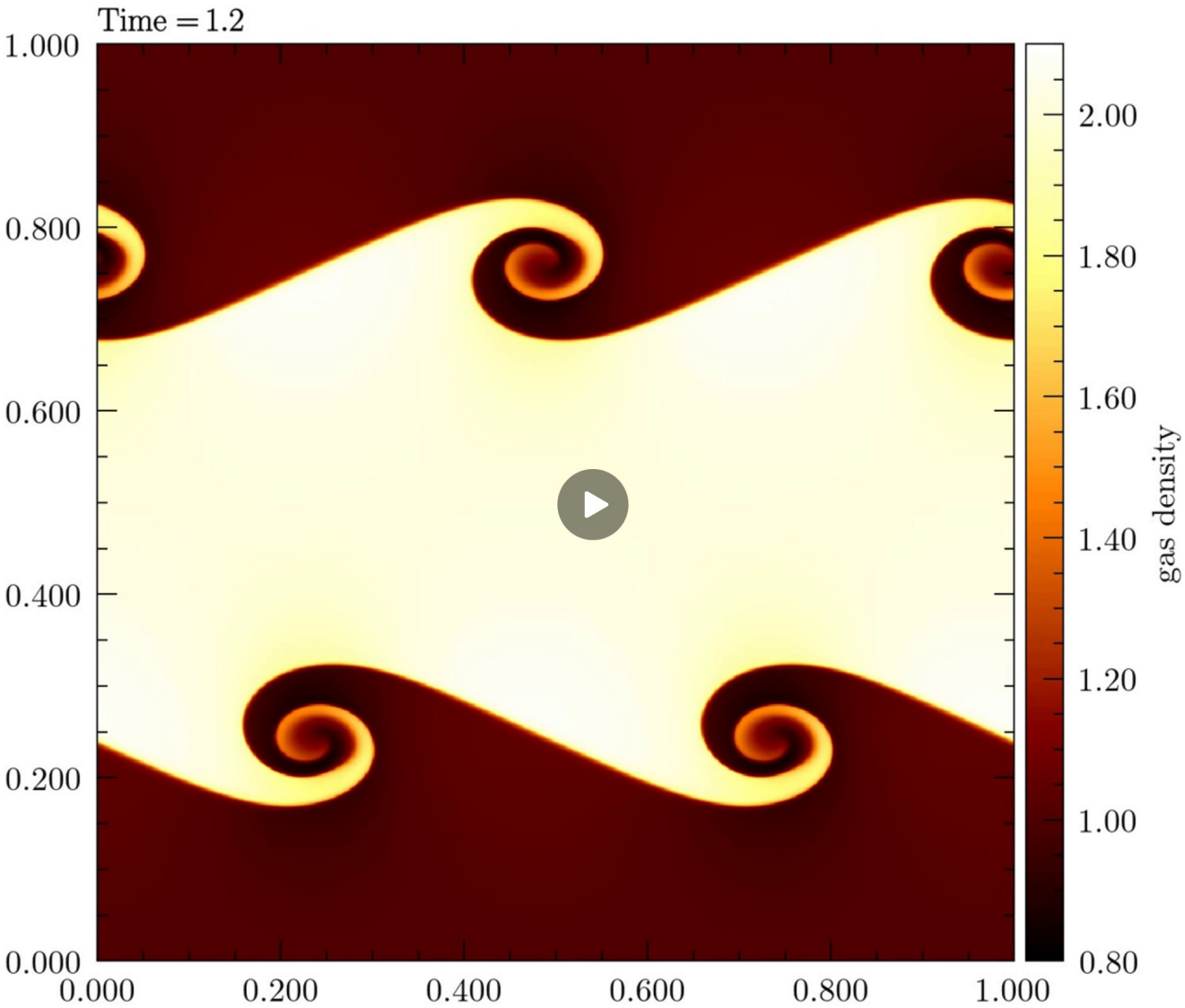


(Saturn)

https://www.nasa.gov/multimedia/imagegallery

Kelvin-Helmholtz instability

Movies available: https://www.mso.anu.edu.au/~chfeder/movies/kh/kh.html



Kelvin-Helmholtz instability

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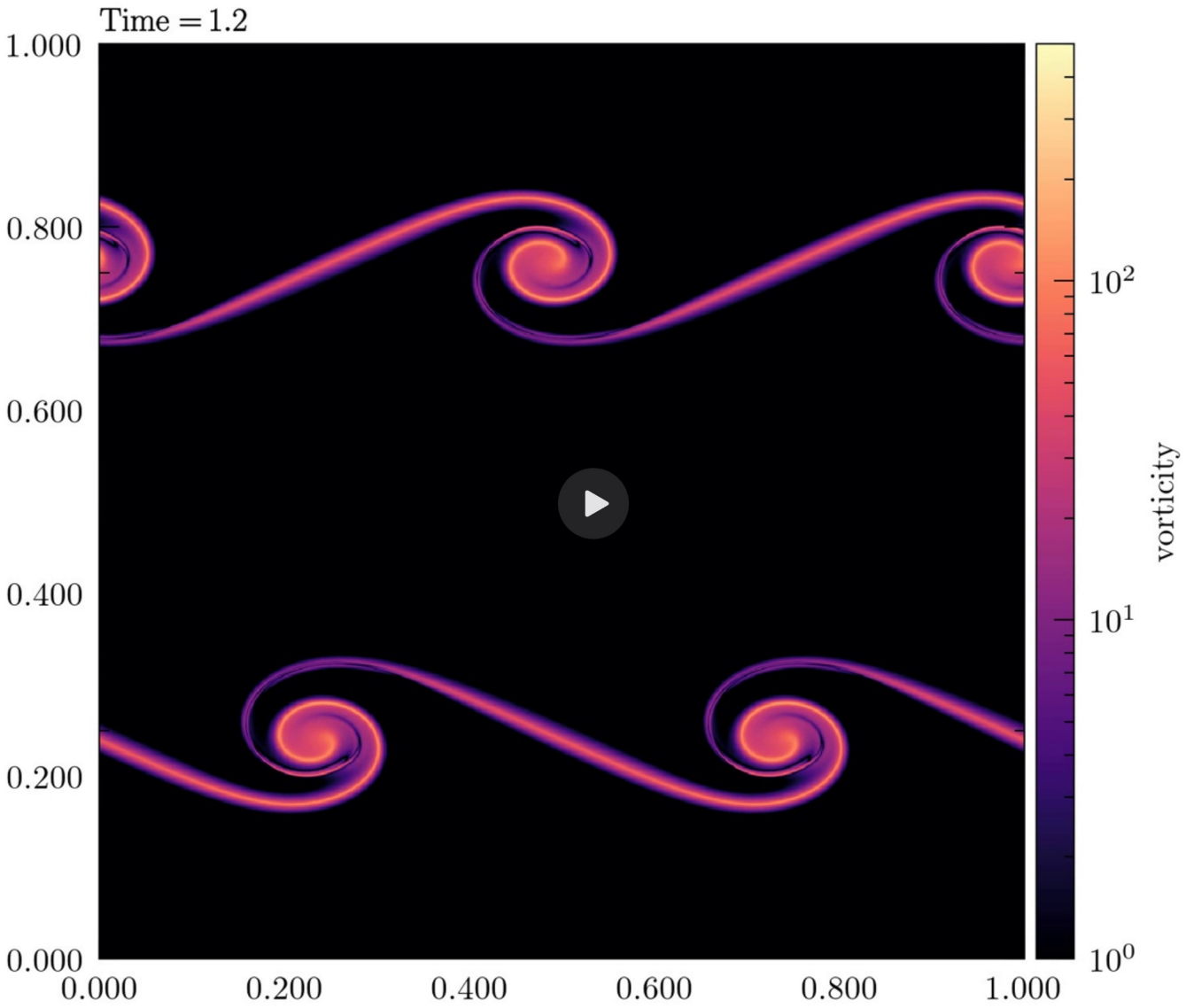
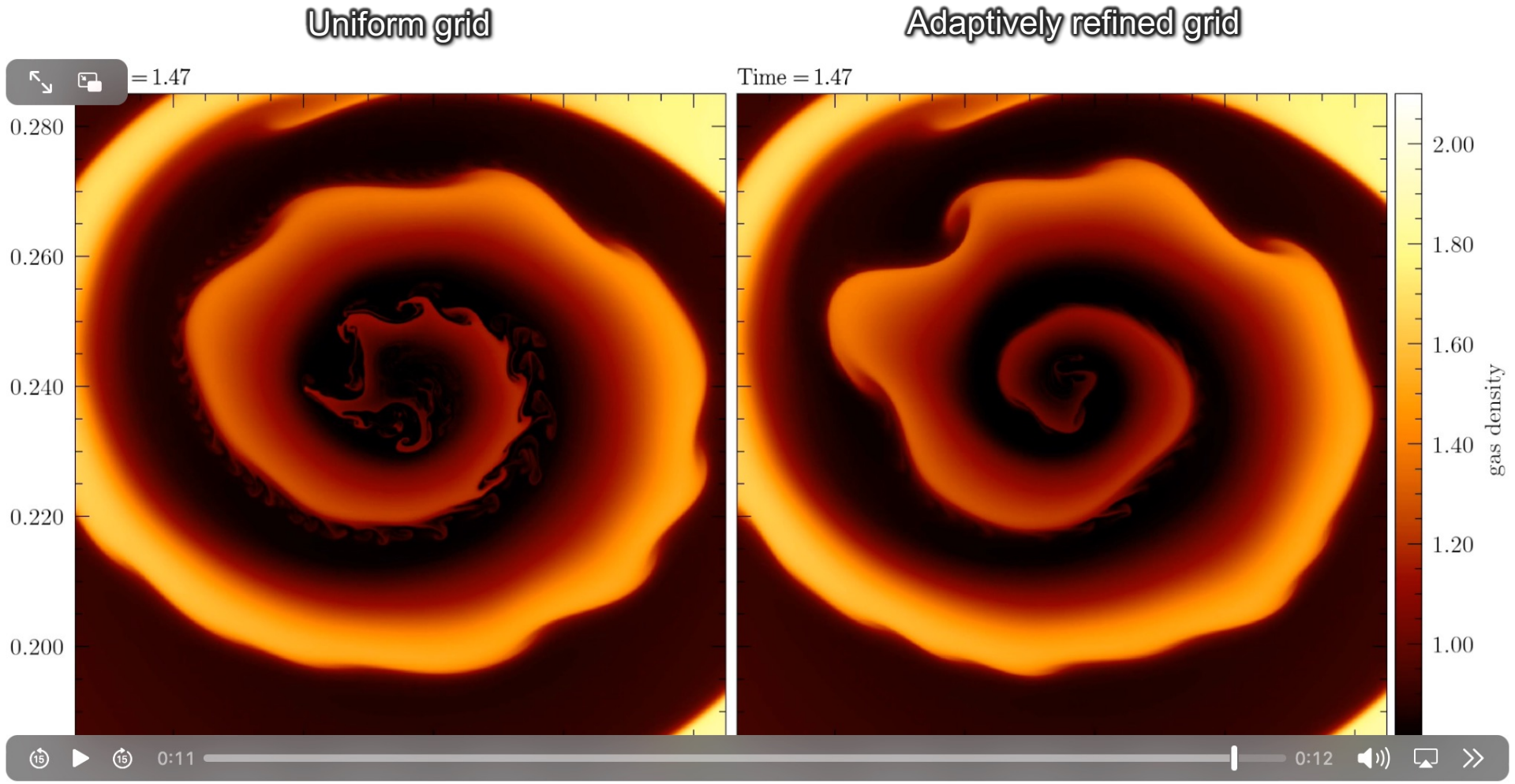


Kelvin-Helmholtz instability



Movies available: https://www.mso.anu.edu.au/~chfeder/movies/kh/kh.html

Rayleigh-Taylor instability

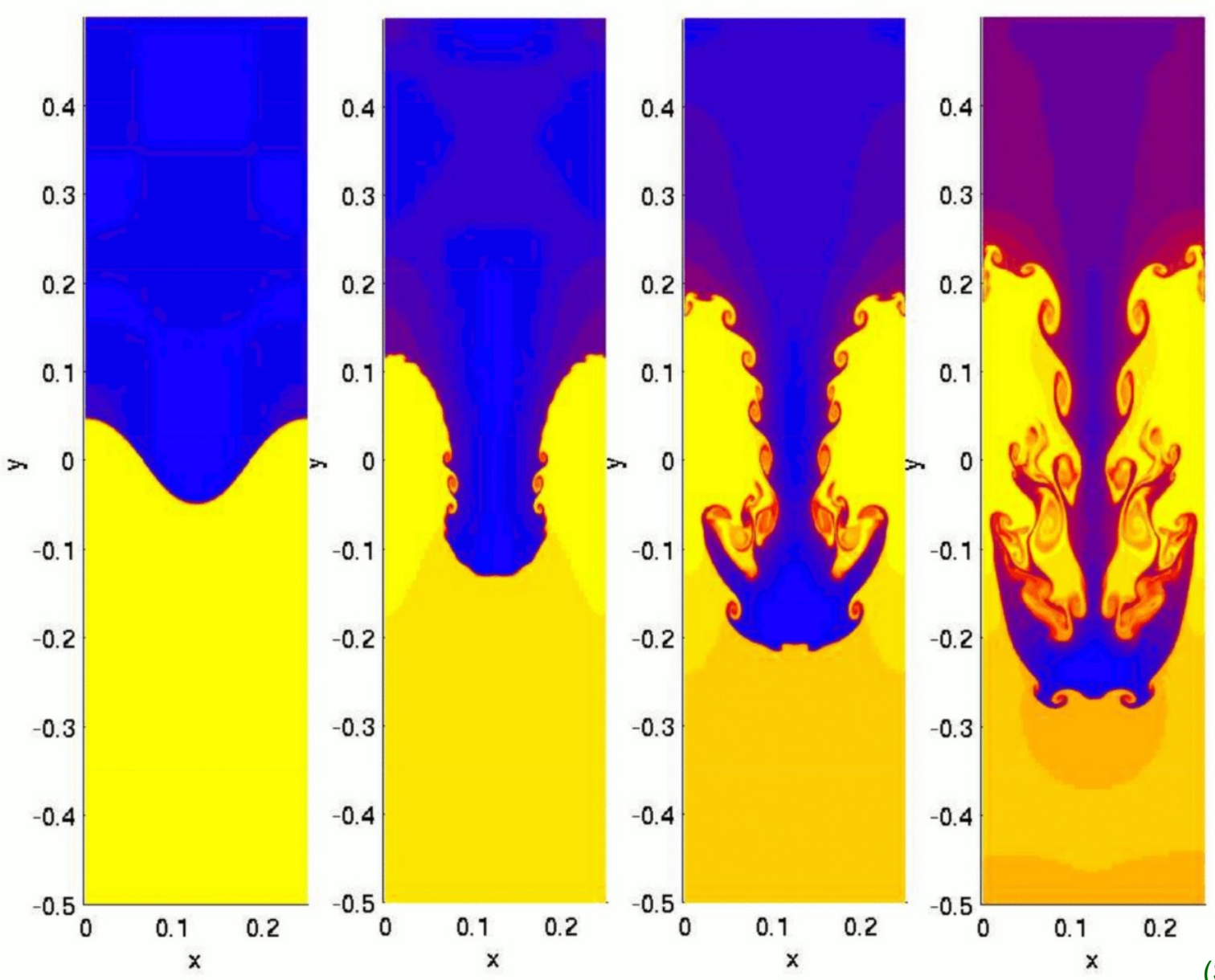
Denser fluid (red) mixes with less dense fluid (transparent)

Time

Gravity

https://images.slideplayer.com/14/4208308/slides/slide_21.jpg

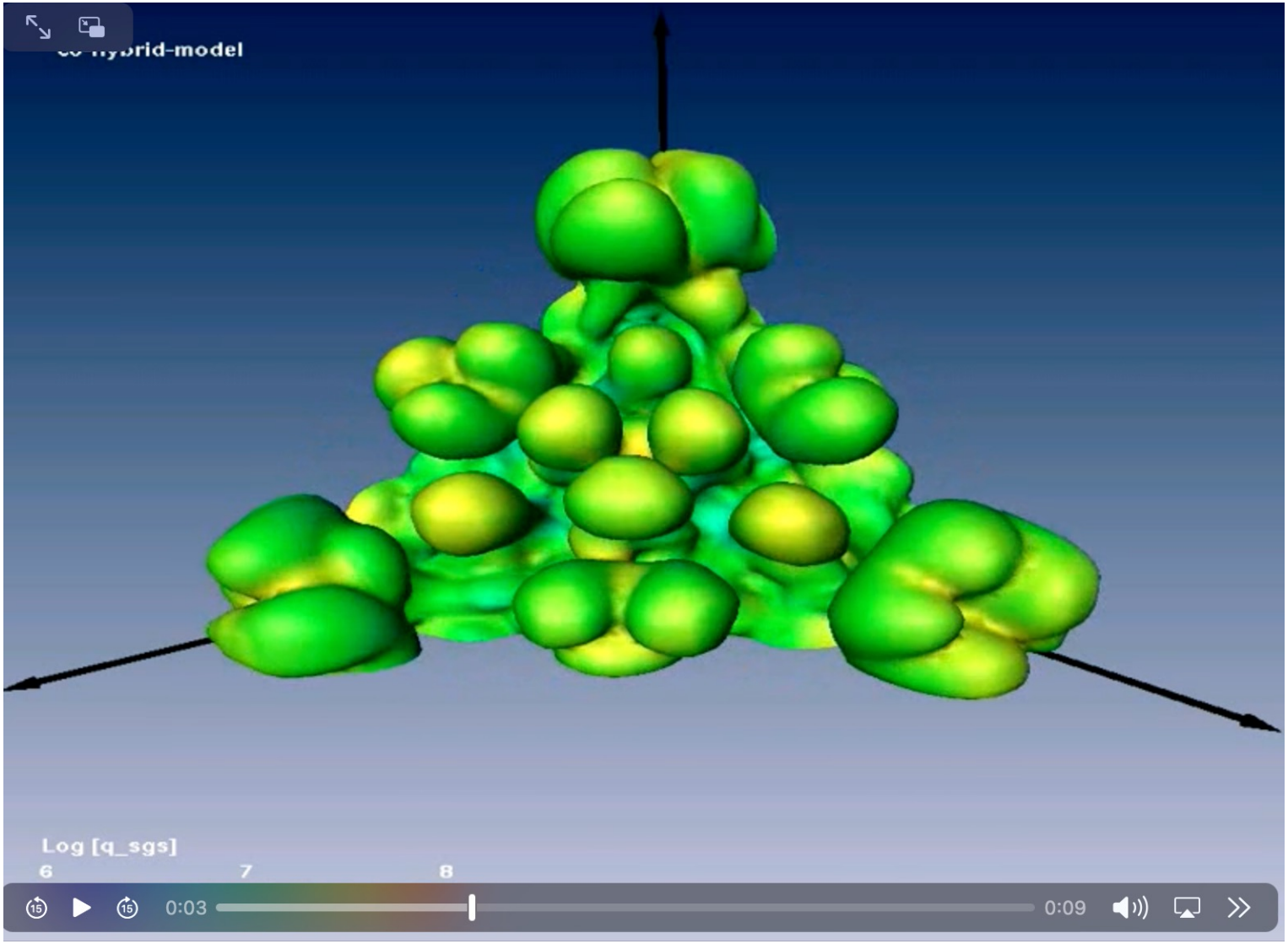
Rayleigh-Taylor instability



(Shengtai Li, Hui Li)

Rayleigh-Taylor instability

Movies available: http://www.mso.anu.edu.au/~chfeder/movies/supernova/supernova_movies.html



(Simulation of Type Ia Supernova explosion)

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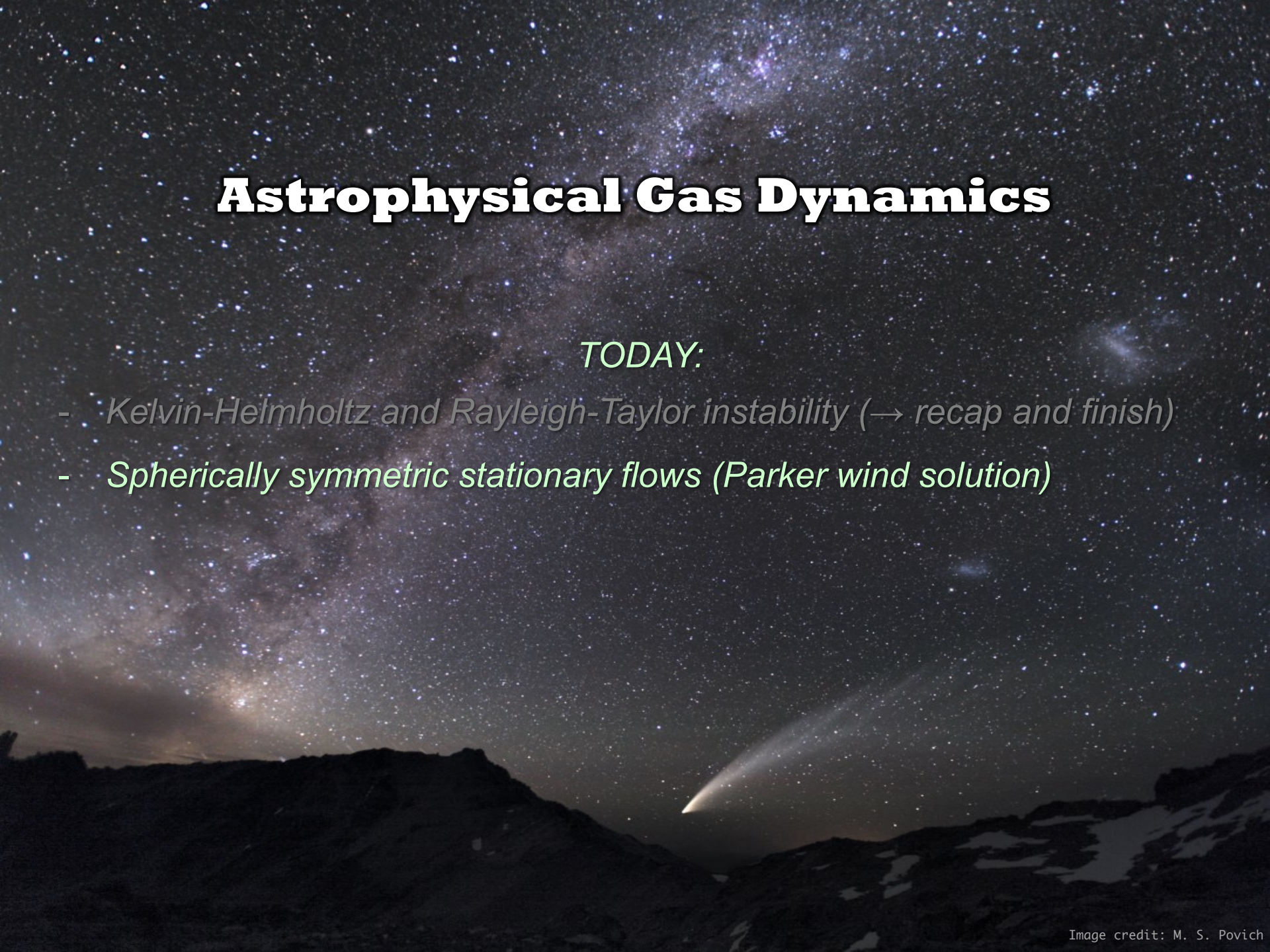
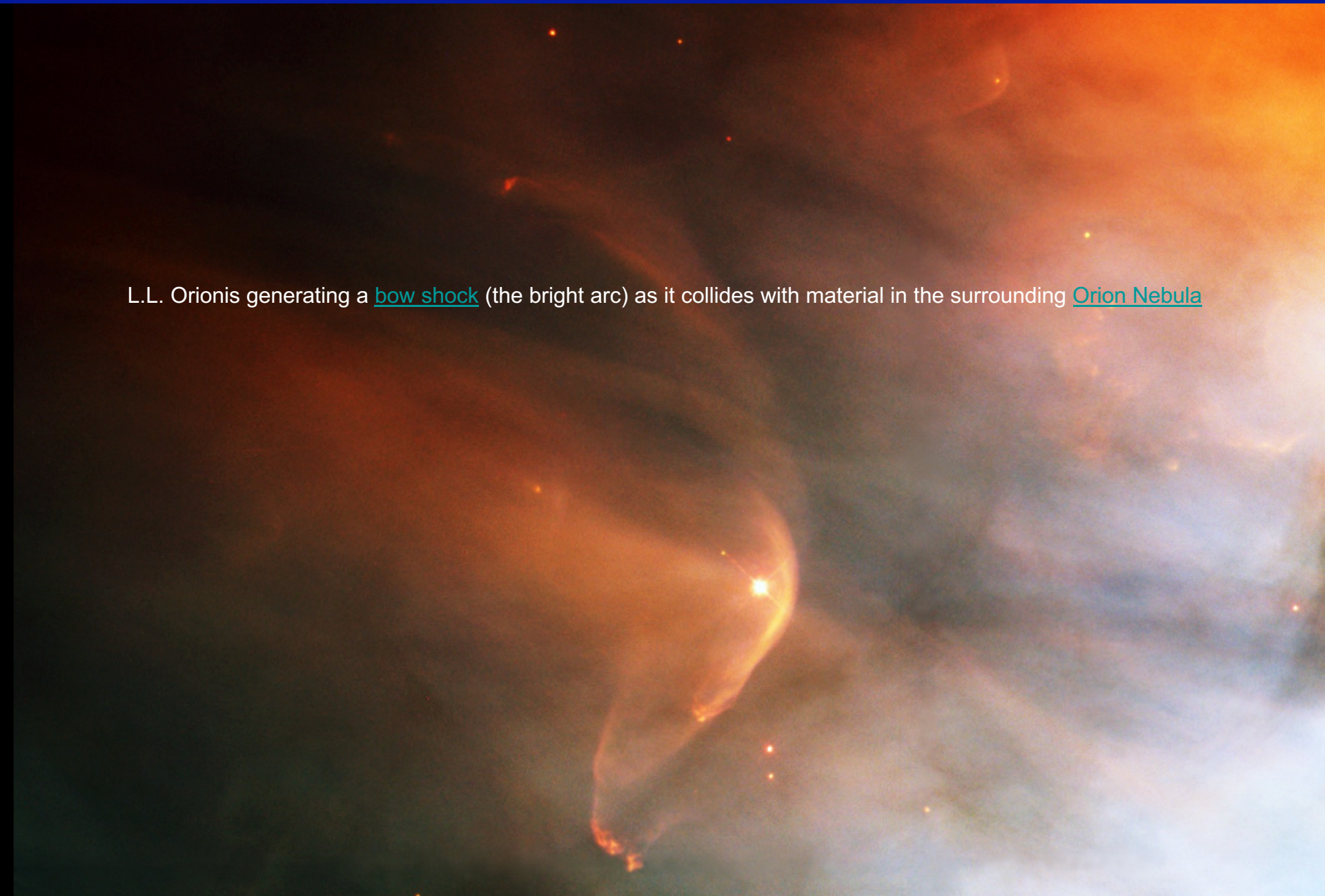


Image credit: M. S. Povich

Stellar winds



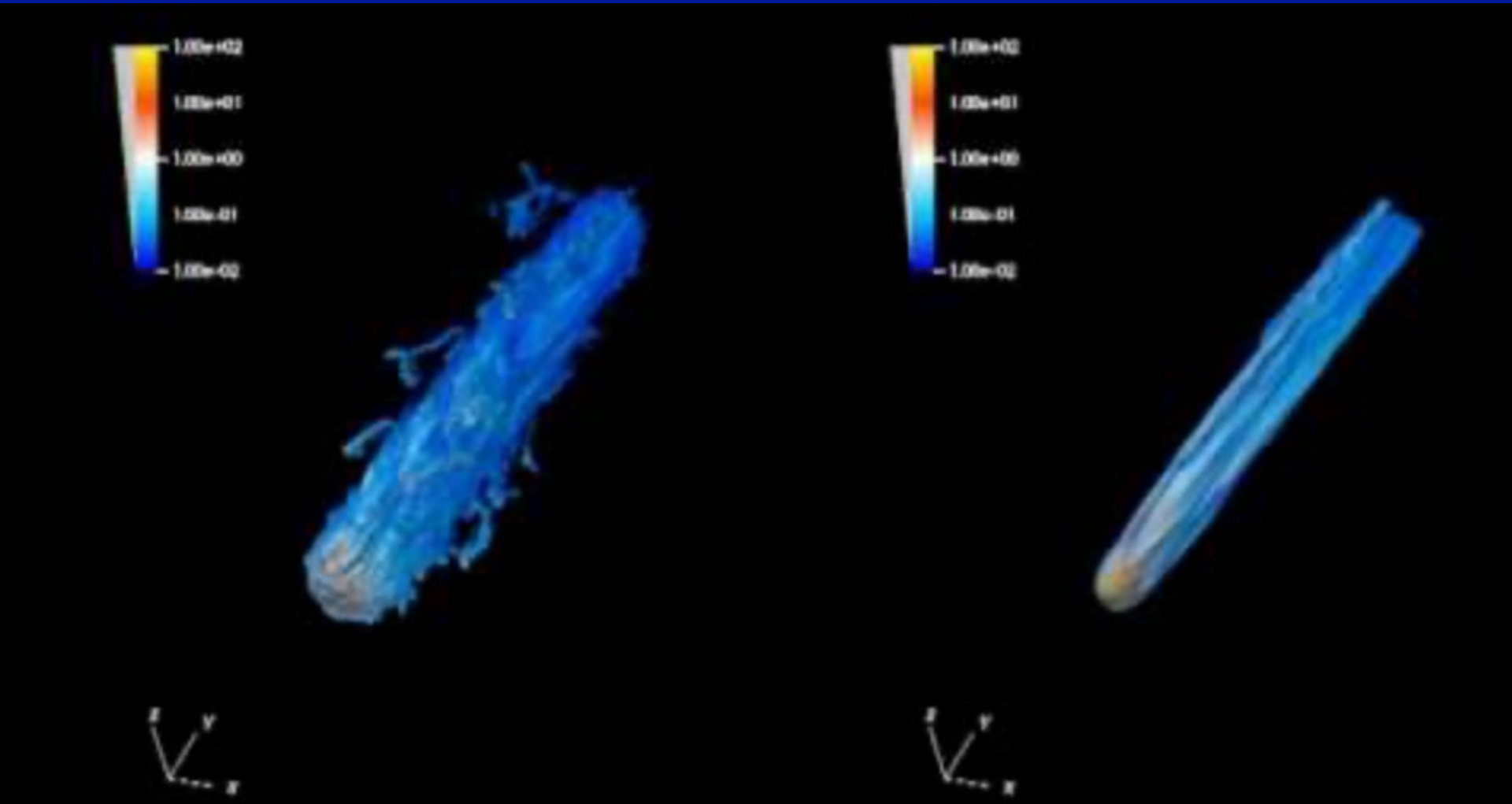
L.L. Orionis generating a bow shock (the bright arc) as it collides with material in the surrounding Orion Nebula

Stellar winds

In planetary nebula NGC 6565, a cloud of gas was ejected from the star after strong stellar winds

We will now derive the Parker wind solution in spherical symmetry…

Wind-cloud interactions



https://youtu.be/gviipq6EFdw

(Banda-Barragan et al. 2018)

Astrophysical Gas Dynamics

NEXT TIME:

- *Spherically symmetric stationary flows (Bondi accretion)*

Image credit: M. S. Povich