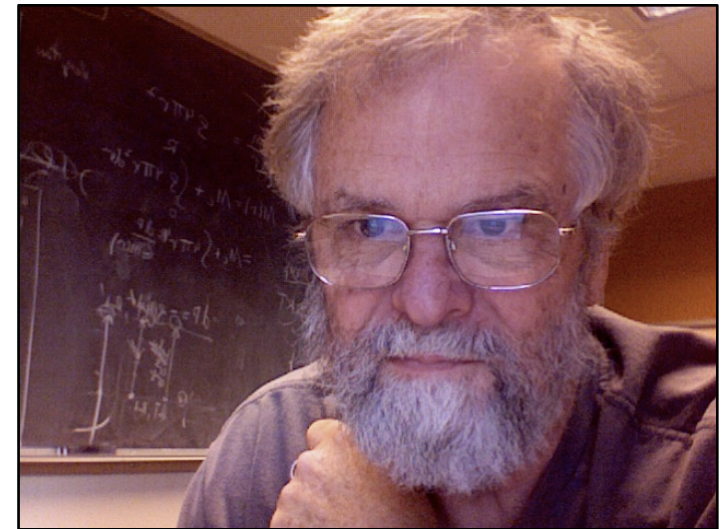


# MESA

Modules for Experiments in Stellar Astrophysics

MESA is a state-of-the-art,  
modular, open source suite for  
stellar evolution



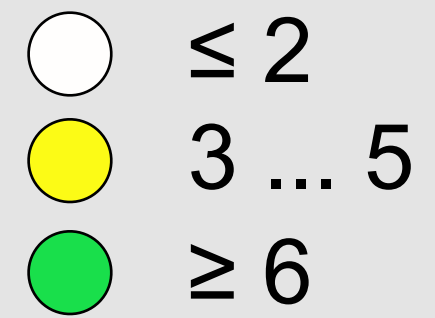
Bill Paxton, father of MESA

- MESA Stellar Evolution Code: [mesa.sourceforge.net](https://mesa.sourceforge.net)
- MESA Instrument Papers ([Paxton et al. 2011, 2013](#))

# MESA

- **Openness:** anyone can download sources from the website.
- **Modularity:** independent modules for physics and for numerical algorithms; the parts can be used stand-alone.
- **Wide Applicability:** capable of calculating the evolution of stars in a wide range of environments.
- **Modern Techniques:** advanced AMR, fully coupled solution for composition and abundances, mass loss and gain, etc.
- **Comprehensive Microphysics:** up-to-date, wide-ranging, flexible, and independently useable microphysics modules.
- **Performance:** runs well on a personal computer and makes effective use of parallelism with multi-core architectures.

MESA



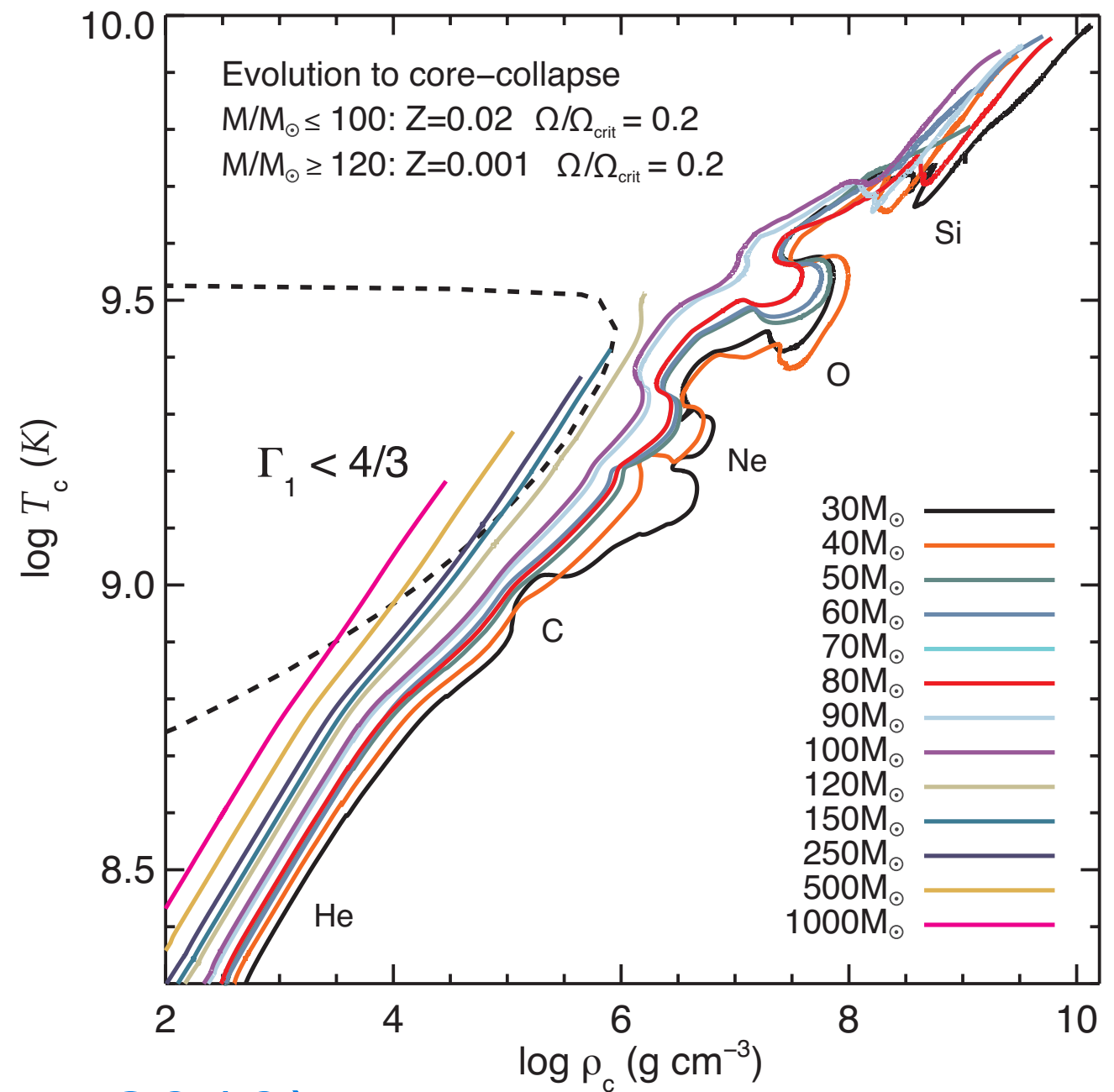
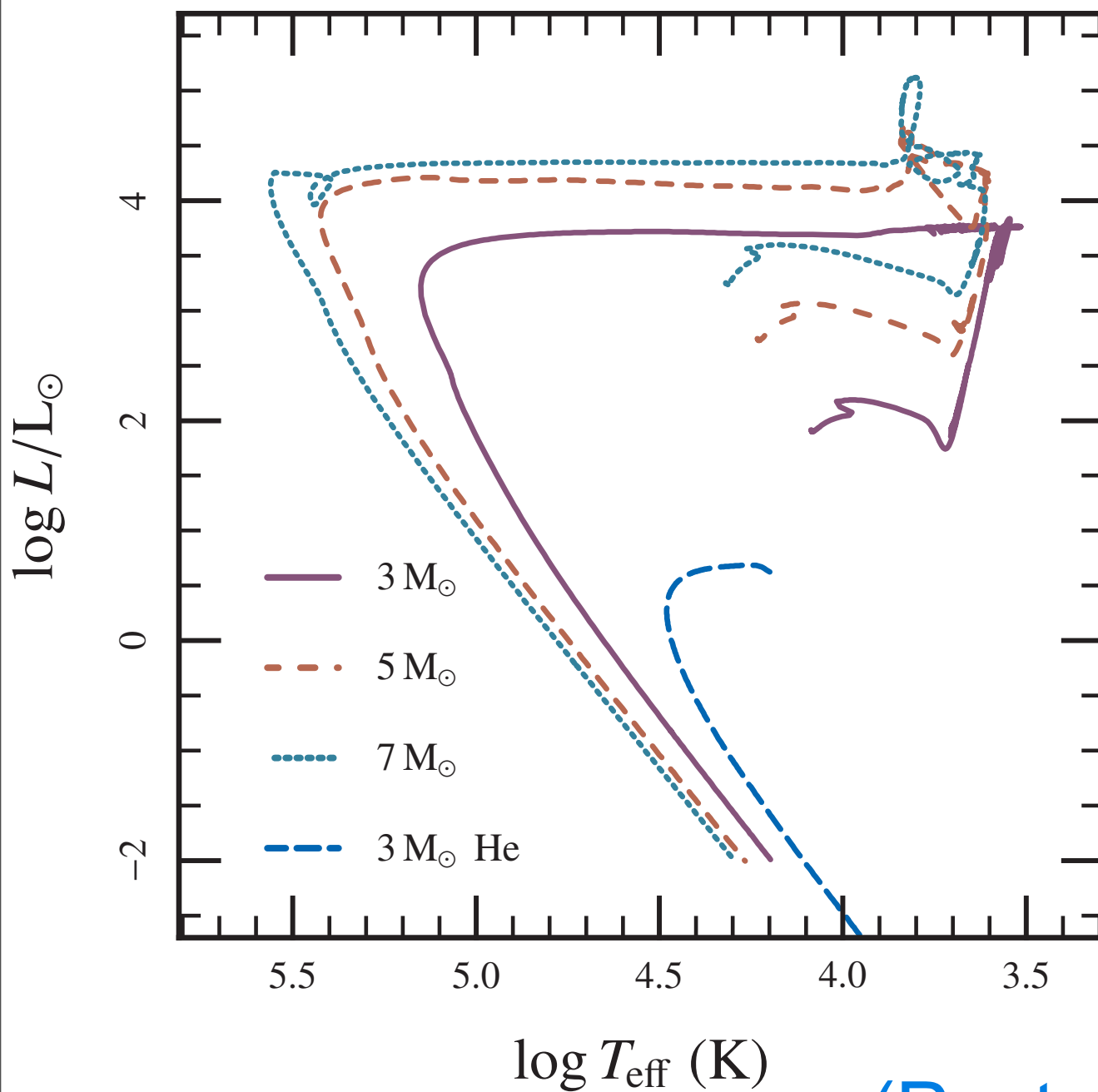
# **MESA Capabilities**



# Single stars/planets with

# MESA

## ■ Uninterrupted evolution to WD and core-collapse

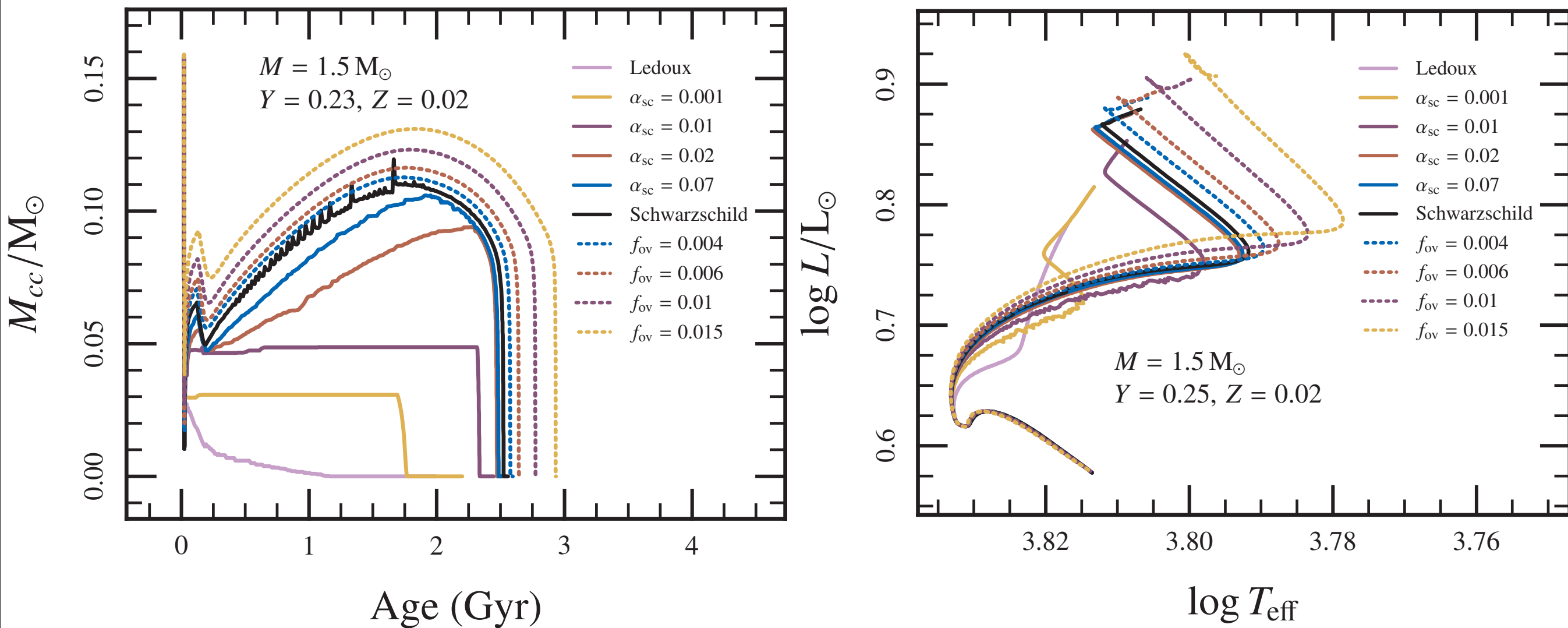


(Paxton+ 2013)

# Single stars/planets with

# MESA

- Mass loss/gain, Schwarzschild/Ledoux, overshooting, double diffusion, gravitational settling, radiative levitation...

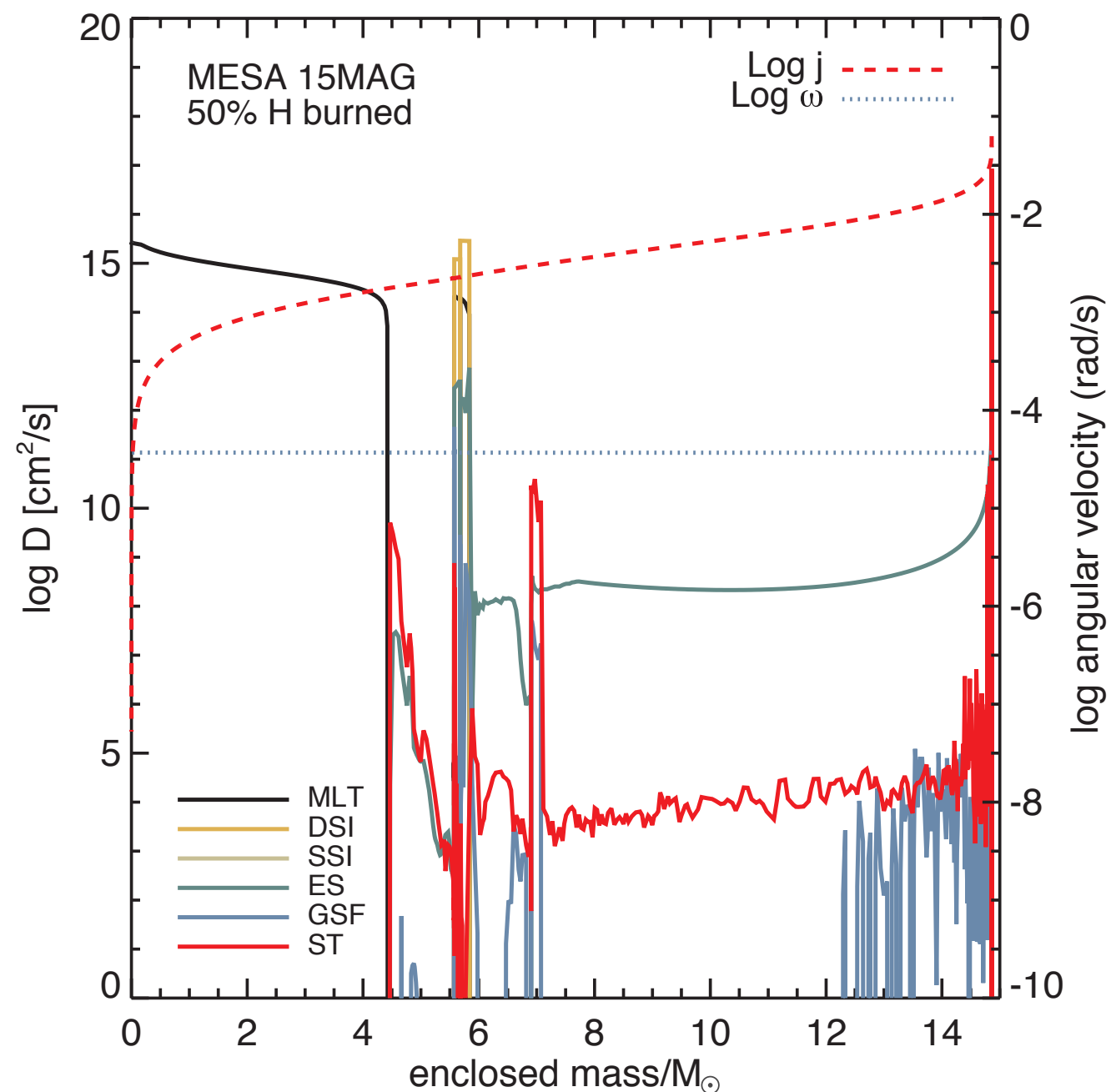
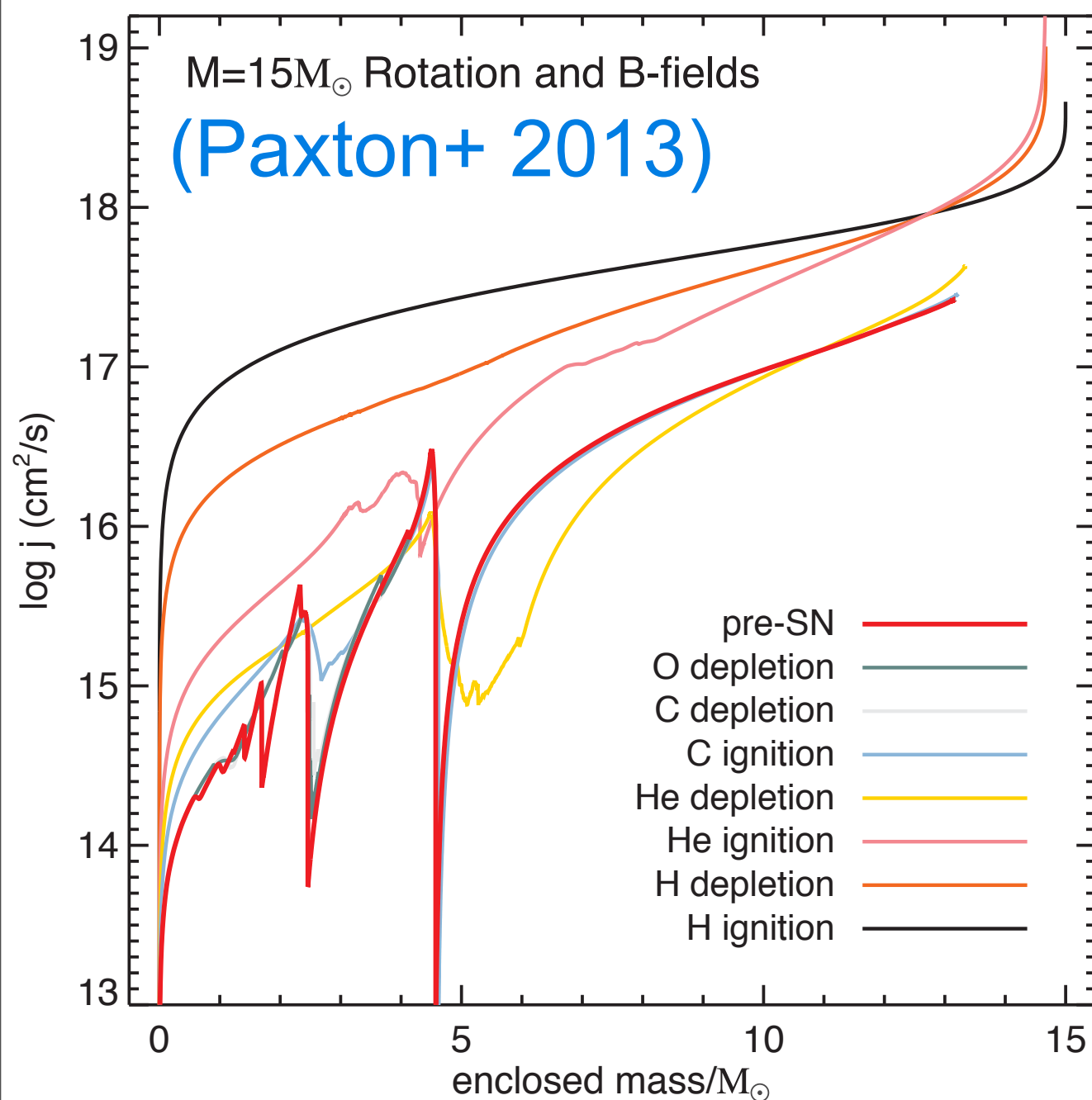


(Paxton+ 2013)

# Single stars/planets with

# MESA

- Includes the physics of **rotation** (in a diffusion approximation) and of dynamo generated **magnetic fields** in radiative zones



- Mass loss/gain, Schwarzschild/Ledoux, double diffusion, gravitational settling, radiative levitation...
- It includes the physics of **rotation** (in a diffusion approximation) and of dynamo generated **magnetic fields** in radiative zones
- It is natively coupled with two oscillations codes: **ADIPLS** (J. Christensen-Dalsgaard) and the non-adiabatic **GYRE** code (Rich Townsend). **Asteroseismology**
- Giant planets, Low-mass stars, Massive Stars, Compact Objects, Asteroseismology, Accretion / Massloss...

(Paxton+ 2011, 2013)