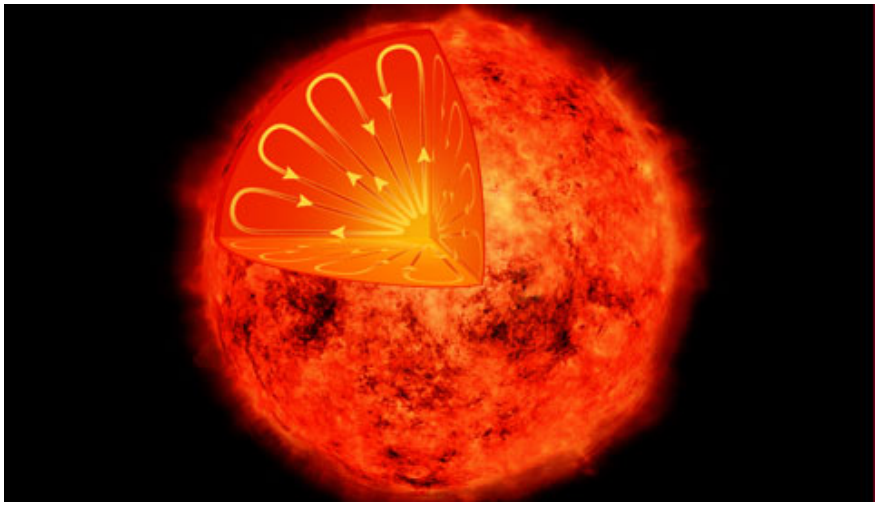
Course for spring 2025:

Astronomy 525
Stellar Astrophysics



Notes: This is a class in the 4 semester graduate astrophysics sequence. It is taught once every other year. Stellar structure and evolution is a core course in astrophysical theory, so all astrophysics students are strongly encouraged to enroll. In addition, it will contain much of the material from the old Astrophysical Fluid Dynamics course, which gives one the tools to study disks as well as stars. The class will be a combination of order-of-magnitude estimates, theory, and numerics. For the numerical portion, students will analyze data from the stellar evolution code MESA. They will also write their own codes from scratch in class for simplified versions of the equilibrium and mode eigenvalue problems, learning the needed numerical techniques. Grades will be based on homework, and ample time for homework will be provided in class, so there will be little out-of-class work.

Course topics: spectral features of stars, color-magnitude diagrams, ionization stages, equations of state, fluid dynamics and hydrostatics, radiative diffusion and equilibrium, opacity sources, nuclear reactions, hydrodynamic perturbation theory (p-waves, g-waves, instabilities), convection and mixing-length theory, magnetohydrodynamics and dynamos, star formation, post-main sequence evolution, compact objects (white dwarfs and neutron stars), disk accretion

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Meeting: TuTh 10:35-11:50am, Webster 941