Structure and Dynamics of Compact Stars

Omar Benhar

★ The course will consist of two-hour lectures twice a week, for a total of twenty hours, or three credits
Lectures will start on March, 2021

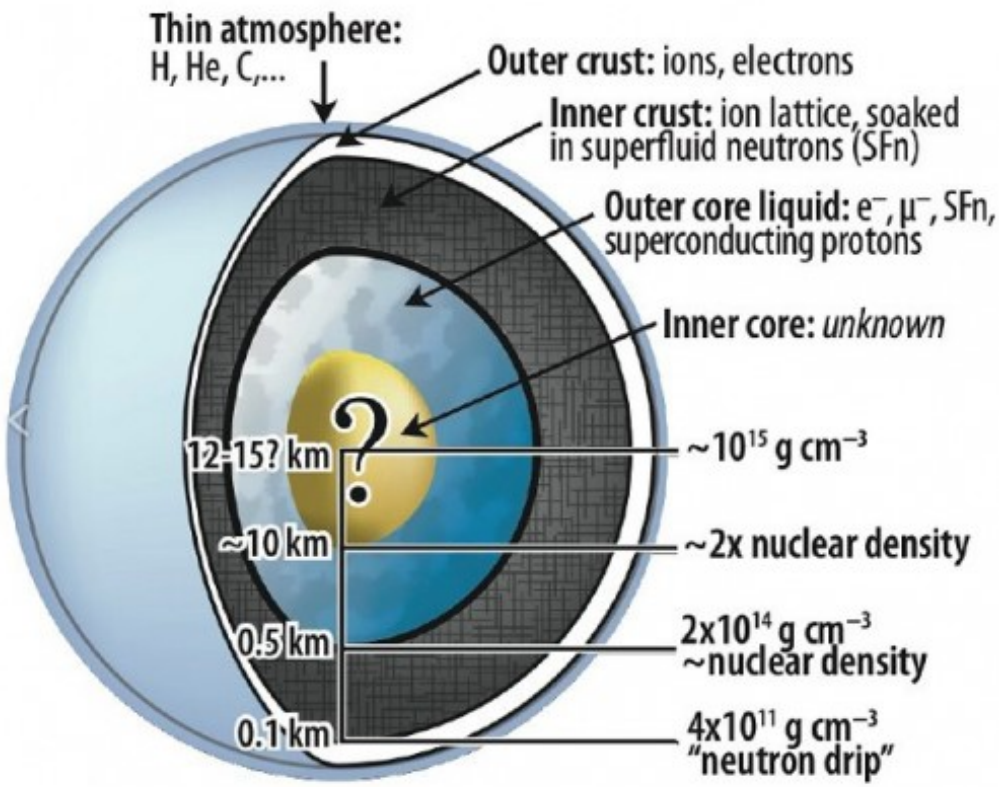
★ The final exam will be a ∼30 minute long presentation, on a subject chosen from those discussed in class

★ The only requirements are the classes of Relativistic Quantum Mechanics and Introduction to Nuclear and Particle Physics
No prior knowledge of General Relativity will be assumed

★ Students interested in taking the class are requested to email me at omar.benhar@roma1.infn.it to make schedule arrangements.

Snapshot of the Interior of a Compact Star

- ★ Compact stars are formed in the final stage of stellar evolution.



- ★ Stable configurations of compact stars involve different forms of matter featuring different constituents, from nuclei to nucleons and deconfined quarks. spanning over eight orders of magnitude in density

(Tentative) Syllabus

- ★ Introduction to the physics of dense matter. Significance and dynamical content of the equation of state
- ★ Equlibrium of compact stars: white dwarfs and neutron stars. Equation of Tolman, Oppenheimer and Volkoff
- ★ Structure and dynamics of the outer core
  - ▹ Equation of state of β-stable matter (n, p, e, μ)
  - ▹ Transition to *exotic* phases: strange hadronic matter and quark matter
  - ▹ Neutrino emission and absorption. Thermal evolution
- ★ Interpretation of gravitational-wave and multimessenger observations

- ★ Further information is available online at

  http://chimera.roma1.infn.it/OMAR/dottorato/