Neutron Star Physics
Equation of State and Structure

Nuclear Astrophysics Group

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Abstract

Analysis of neutron star structure including mass-radius relations, equation of state, and magnetic field properties.

1 Introduction

Neutron stars are ultra-dense remnants of massive stars.

2 Equation of State

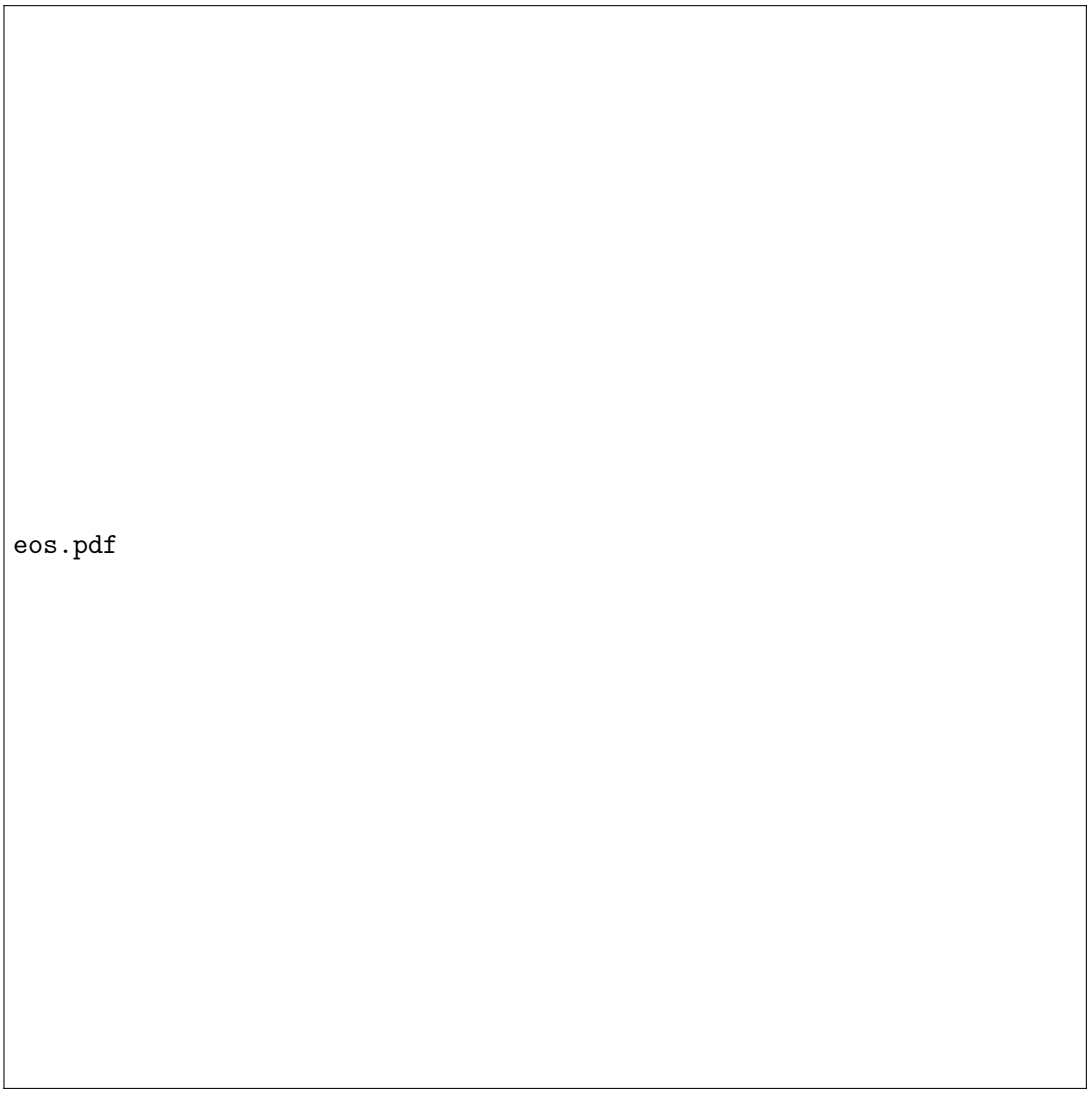

Figure 1: Polytropic equation of state.

3 TOV Equation

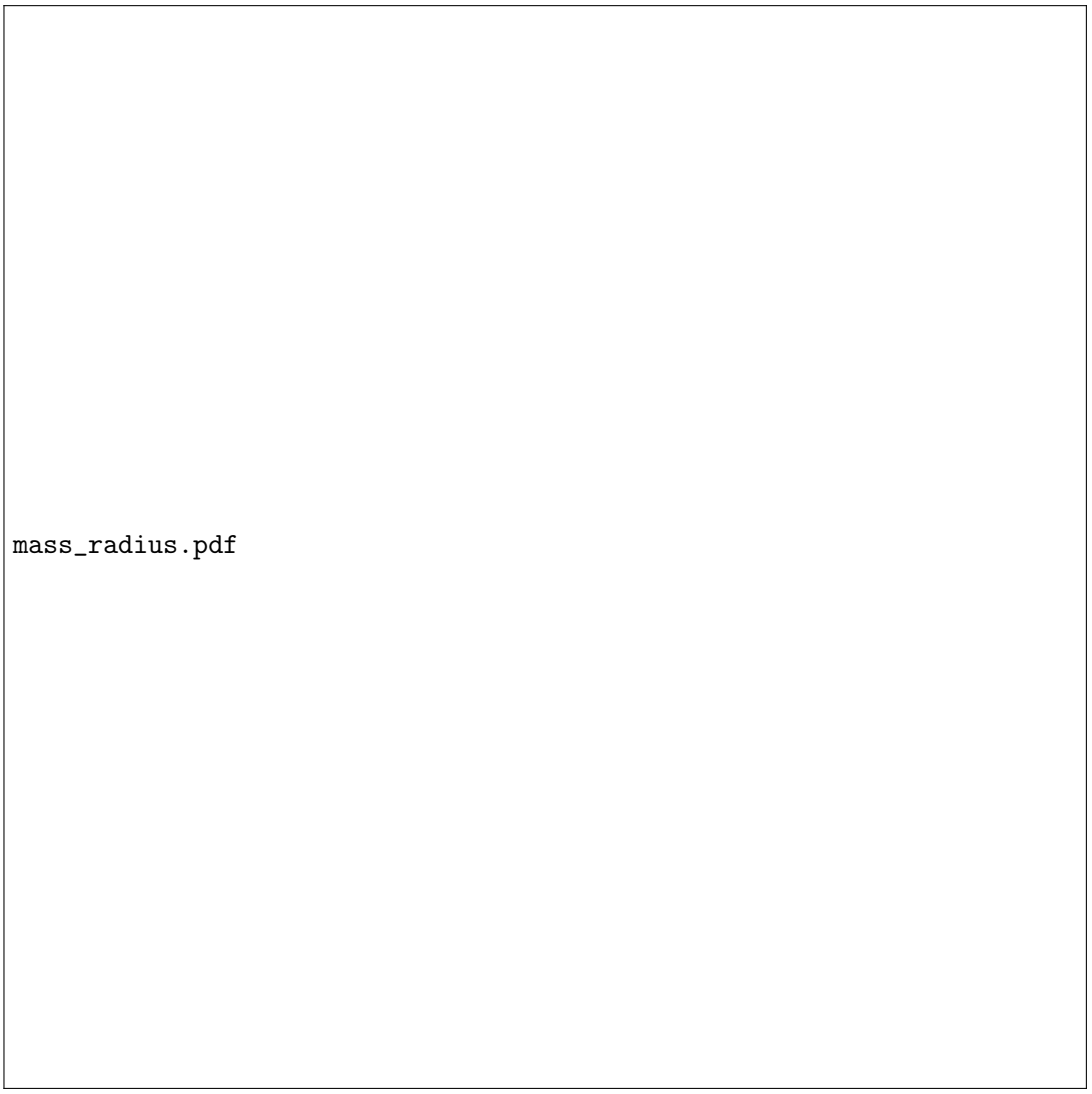

Figure 2: Neutron star mass-radius relation.

4 Density Profile

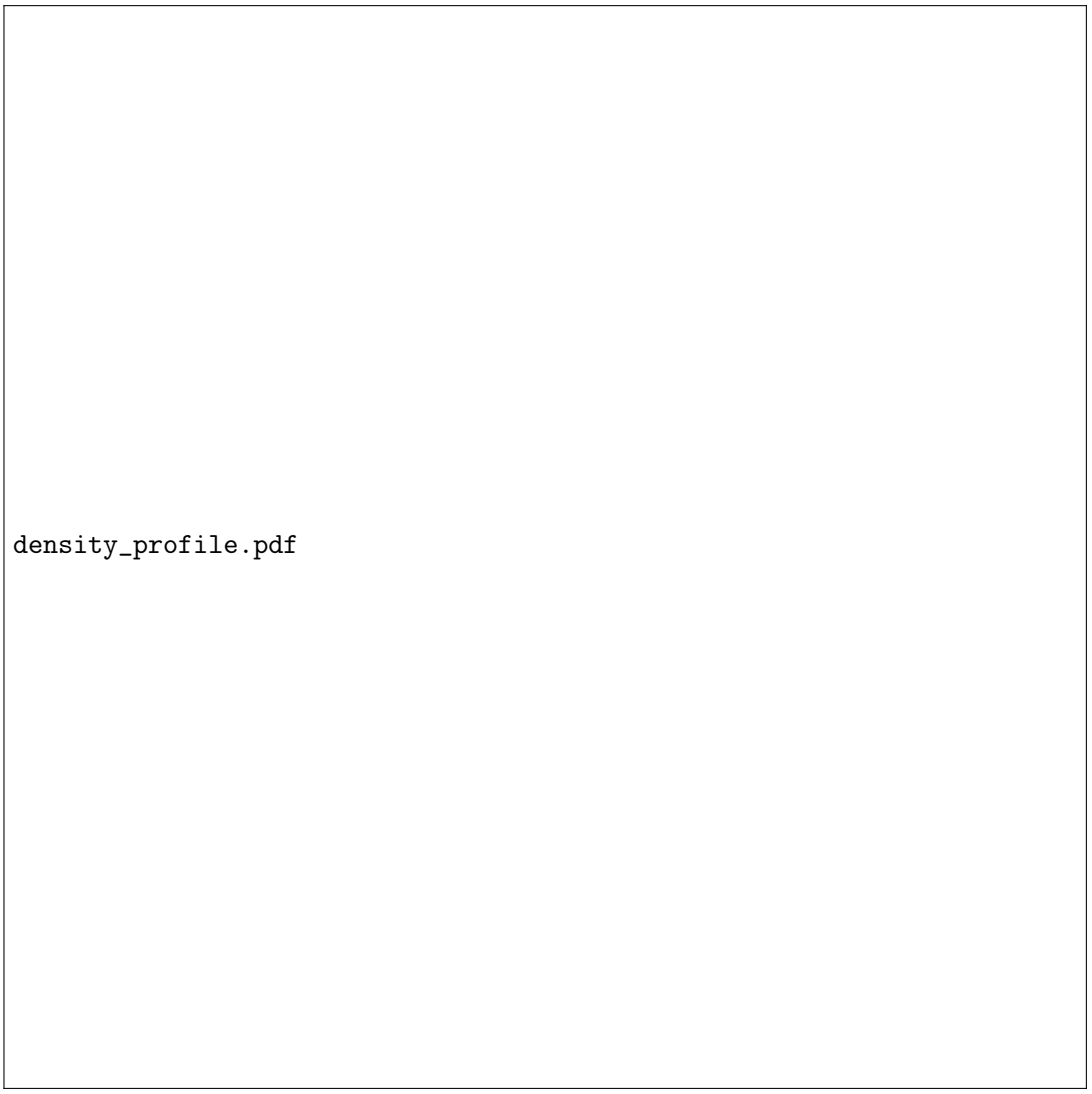

Figure 3: Internal density profile.

5 Magnetic Field

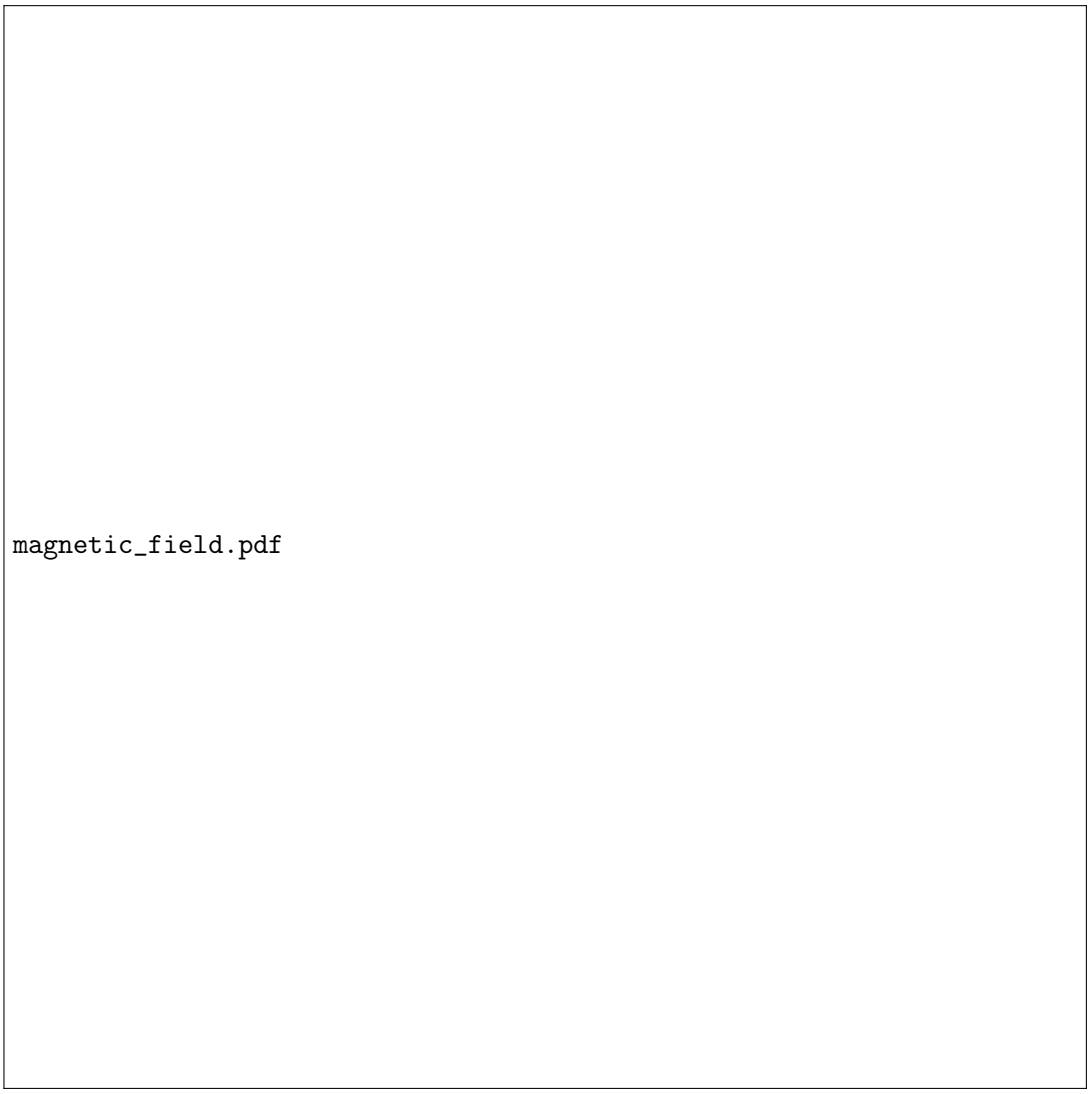

Figure 4: P-$\dot{P}$ diagram with magnetic field lines.

6 Spin-down Age

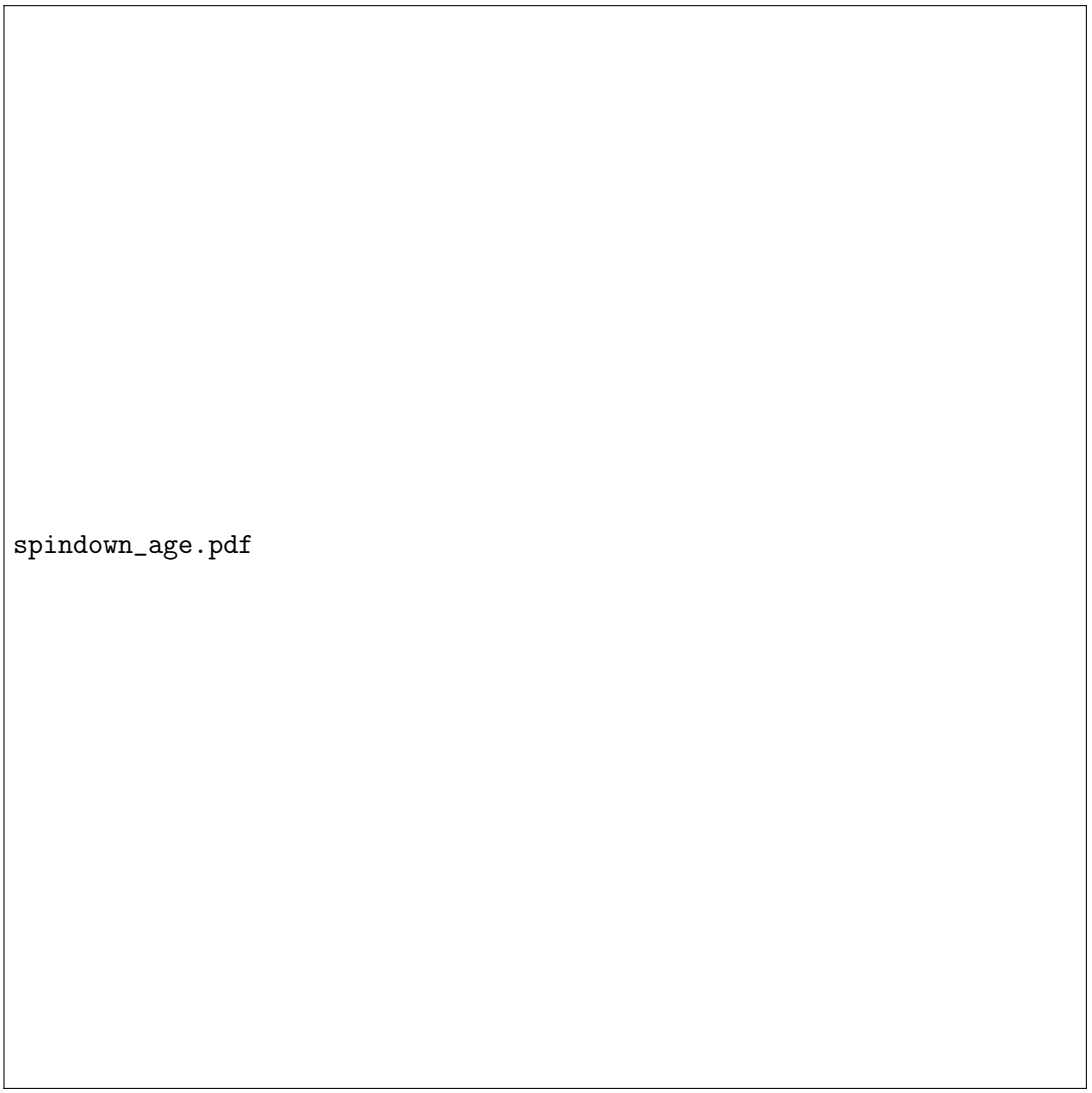

Figure 5: Characteristic age vs period.

7 Compactness

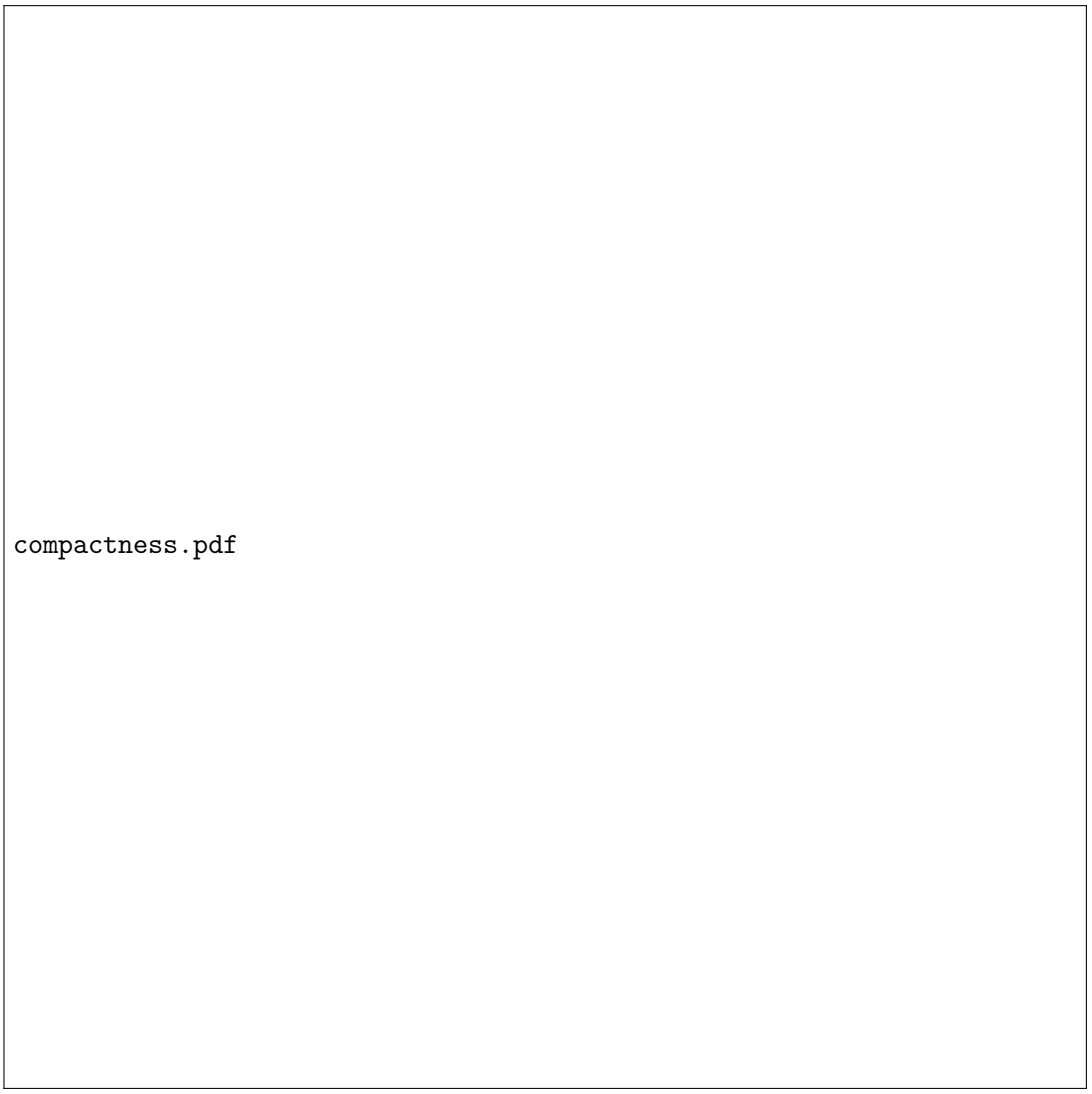

Figure 6: Compactness parameter.

8 Results

9 Conclusions

Neutron star structure depends critically on the equation of state of ultra-dense matter.