



UNIVERSITÀ  
degli STUDI  
di CATANIA



DIPARTIMENTO DI FISICA E ASTRONOMIA

DOTTORATO DI RICERCA IN FISICA

ANNO ACCADEMICO 2018 - 2019

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## Physics and Astrophysics of Neutron Stars

2 CFU

### Teaching staff

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### Program of the course

**Lect. 1.** Neutron Stars : a general overview – Observations vs. theory.

**Lect. 2.** Structure and EoS of Neutron Star Crusts – Cold equation of state below the neutron drip point.

**Lect. 3.** The inner core – Cold equation of state above the neutron drip point.

**Lect. 4.** The nuclear many-body problem – Theoretical methods for the equation of state of the inner core.

**Lect. 5.** Strange matter in the inner core : Hyperons and kaons.

**Lect. 6.** The hadron-quark phase transition in the stellar core.

**Lect. 7.** Gravitational waves astronomy – Neutron Stars Binary mergers.

**Each lecture will last 2 hours.**

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### Bibliography:

- P. Haensel, A.Y. Potekhin, D. G. Yakovlev, “Neutron Stars I. Equation of State and Structure” Springer - Verlag, 2007
- M. Baldo and F. Burgio, “Properties of the nuclear medium”, Rep. Prog. Phys. **75** (2012) 026301
- S. Shapiro and S. Teukolsky, “Black Holes, White Dwarfs and Neutron Stars, Wiley Verlag, 2004