

Iniziativa specifica: NEUMATT

Titolo:

Neutron star matter

Research line: Astro-Particle Physics

Topics

Nuclear matter in neutron stars; Quark matter; Nuclear physics aspects of novae, supernovae, and other explosive environments; Mergers of Compact stars; Neutron star crust.

Proposed activities of the Pisa Research Unit

- Equation of state of deconfined quark matter at finite temperature.**
- Study of the role of the quark deconfinement phase transition in binary neutron star mergers**
- Hyperons in dense matter, in neutron stars, and in binary neutron star mergers.**

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Highlights:

Was GW190814 a black hole - strange quark star system?

I. Bombaci, A. Drago, D. Logoteta, G. Pagliara, I. Vidana, *Phys. Rev. Lett.* **126**, 162702 (2021)

In August 2019, the LIGO-Virgo gravitational-wave network observed a GW signal produced by the merger of a $23 M_{\odot}$ black hole and a compact star with mass $M_2 = (2.50 - 2.67) M_{\odot}$. GW190814's secondary mass lies in the hypothesized lower mass gap of $2.5-5 M_{\odot}$ between known NSs and BHs. GW190814's secondary could be the heaviest neutron star or the lightest black hole ever observed. We show that GW190814's secondary could be a Strange Quark Star.

A new microscopic EOS for dense nuclear matter at finite temperature and applications in numerical simulation in GR of binary neutron star mergers

Microscopic equation of state of hot nuclear matter for numerical relativity simulations

D. Logoteta, A. Perego, I. Bombaci, *Astron. & Astrophys.* **646**, A55 (2021)

Accretion-induced prompt black hole formation in asymmetric neutron star mergers, dynamical ejecta, and kilonova signals

S. Bernuzzi et al. *MNRAS* **497** (2020) 1488

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Sezioni INFN partecipanti e responsabili locali:

- Sez. di Ferrara: Alessandro Drago (responsabile nazionale)
- Sez. di Catania: Hans-Josef Schulze
- LNGS: Giulia Pagliaroli
- Sez. di Milano: Pierre Pizzochero
- Sez. di Pisa: Ignazio Bombaci

Partecipanti sezione di Pisa

- **Ignazio Bombaci (100%)**
- **Domenico Logoteta (RTDa 80%) fino al 1° Novembre 2021**