CIDMA CENTRO DE I&D EM MATEMÁTICA E APLICAÇÕES
CENTER FOR R&D IN MATHEMATICS AND APPLICATIONS

universidade de aveiro

Gravitational Geometry and Dynamics Group Seminar

Tue., May. 28th, 2024, at 14h00.

Room: 11.2.21 and **Zoom ID:** 989 6252 0928
(*Password: contact graposo@ua.pt)*

Jet-like structures in low-mass binary neutron star merger remnants

Milton Ruiz

University of Valencia

GW170817 and GRB 170817A provided direct evidence that binary neutron star (NSNS) mergers can produce short gamma-ray bursts (sGRBs). However, questions remain about the nature of the central engine. Depending on the mass, the merger remnant may promptly collapse to a black hole (BH), form a hypermassive star which undergoes a delayed collapse to a BH after several tens of rotation periods, a supramassive star with a much longer lifetime, or an indefinitely stable sub-supramassive NS. We have performed general relativistic magnetohydrodynamics (GRMHD) simulations of the merger of both irrotational and spinning, equal-mass NSNSs constructed from a realistic SLy equation of state, with a range of gravitational (ADM) masses from 1.96 to 2.70 MSun. Each NS is endowed with a dipolar magnetic field extending from the interior into the exterior, as in a radio pulsar. The remnants are sub-supramassive for the lowest mass case, supramassive for the intermediate cases and hypermassive for the highest mass case. The latter is the only case that collapses to a BH before our simulation ends. We observe helical magnetic field structures and mildly relativistic outflow from the poles for both the supramassive and hypermassive remnants, and are investigating whether these jet-like structures can be the progenitors of sGRBs.

More about Gr@v at: *gravitation.web.ua.pt*

The Gr@v Seminars are supported in part by the FCT – Portuguese Foundation for Science and Technology, through projects, CERN/FISPAR/0027/2019, PTDC/FIS-AST/3041/2020, 2022.04560.PTDC and thorough CIDMA – Center for Research and Development in Mathematics and Applications, within projects UIDB/04106/2020 (https://doi.org/10.54499/UIDB/04106/2020) and UIDP/04106/2020 (https://doi.org/10.54499/UIDP/04106/2020) .

fct Fundação para a Ciência e a Tecnologia

MARIE CURIE ACTIONS