DEPARTAMENTO DE FÍSICA
UNIVERSIDAD DE SANTIAGO DE CHILE

Seminarios de Física

30 de marzo de 2022
15:30 horas

EXPOSITOR

Ileyk El Mellah
Universidad de Santiago de Chile

TÍTULO

Mass transfer, flares and torques in X-ray binaries

RESUMEN

Compact remnants of massive stars like black holes (BHs) and neutron stars (NSs) are invaluable probes to study matter in strong gravitational, magnetic and radiative fields. But how is material supplied to them? Stellar multiplicity has been recognized as a ubiquitous feature: stars seldom live an effectively single life. In the advanced evolutionary stages of massive binaries, mass transfer via stellar winds can become significant and decide the final fate of both objects. It is the case of high mass X-ray binaries (HMXBs) where a BH or a young and highly magnetized NS captures (or “accretes”) a fraction of the radiatively-driven wind from the blue supergiant it orbits. In these systems, believed to be the progenitors of merging compact objects detected by the LIGO/Virgo gravitational interferometers, we observe X-ray and gamma-ray flares whose origin remains uncertain.

In this talk, I will provide an overview of how the numerical tool improved our understanding of HMXBs, from the donor star to the immediate vicintiy of the compact accretor. First, I will describe the mechanisms responsible for the wind launching, from the deep and optically thick layers of the blue supergiant up to its photosphere. Radiative-hydrodynamics simulations illustrate how the continuous and line opacities trigger instabilities which later form clumps. Then, I will show how we can exploit the stochastic variations of the absorbing column density along the line-of-sight, using the compact companion as an orbiting X-ray point source whose shimmering betrays the wind clumpiness. We will also discuss the specificities of the hybrid mass transfer at play in HMXBs and stress on the conditions suitable for an accretion disk around the accretor. Last, I will report on recent results from particle-in-cell simulations on particle acceleration via magnetic reconnection in the magnetosphere of a spinning black hole accreting from a disk.

ID de reunión: 870 8792 9843
Código de acceso: 946783

fisica.usach.cl
@fisicaUSACH
@fisicaUsach