Poster: Gravitational-Wave Emission by Common-Envelope Evolution of Binary Stars

Y. B. Ginat, H. B. Perets, E. Grishin, V. Desjacques and H. Glanz

Abstract:

Detection of gravitational-wave (GW) sources enables the characterization of binary compact objects and their in-spiral due to GW-emission. However, other dissipative processes can affect the in-spiral. We show that the in-spiral of compact objects through a gaseous common-envelope (CE) arising from an evolved stellar companion produces a novel type of GW-sources, whose evolution is dominated by the dissipative gas dynamical friction effects from the CE, rather than the GW-emission itself. The evolution and properties of the GW-signals differ significantly from those of isolated gas-poor mergers. We find characteristic strains of $\sim 10^{-23}$-10^{-21} (10 kpc/D) for such sources - observable by next-generation space-based GW-detectors. The evolution of the GW-signal may serve to probe the interior parts of the evolved star, and the final stages of CE-evolution, otherwise inaccessible via any other observational means. Moreover, such CE-mergers are frequently followed by observable explosive electromagnetic counterparts and/or the formation of exotic stars.