

## **Title: New Signals from Common-Envelope White Dwarfs**

**Description:** Most of the stars in our Universe are found in binary systems. Through their evolution, many of them should merge in what is known as a common-envelope phase. This phase is mysterious, because any signal from the merging cores is shielded by the common envelopes. But it is key to understand, among others, supernovae or the observed gravitational-wave sources.

If one of the stars in the binary system is a white dwarf, its strong gravitational field is expected to heat infalling gas to high temperatures where thermonuclear reactions should take place. These reactions can emit neutrinos, feebly-interacting particles that would escape the envelope and lead to a direct signal of this important but poorly understood astrophysical phenomenon.

In this project, the student will compute the neutrino signal from such a system, and understand if it is detectable or not.

**Required skills:** Basic understanding of astrophysics, programming and plotting results (Python). Strong interest in fundamental physics.

The specific tasks will be analytic/numeric. The necessary technical tools will be taught during the internship.

**Supervisor, host group, location, and supervision plan:** The supervisor will be Ivan Esteban, and the host group the Particle Physics Group (<http://tp.lc.ehu.es/particulas/>). The work will be carried out at UPV/EHU in Leioa, and regular meetings between the supervisor and the student are expected to take place. The purpose of this meetings will be to discuss the scientific context, establish the relevant goals, and set up the necessary tasks.