



UNIVERSIDAD TECNICA
FEDERICO SANTA MARIA

DEPARTAMENTO
DE FÍSICA

Defensa Seminario de grado para optar al grado de Licenciado en Astrofísica.

Tema: *Predicting the occurrence rate of Jupiter like planets around white dwarfs I: generating a representative population of progenitor systems.*

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Comisión:

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Abstract:

The study of exoplanets has seen remarkable advancements since the first discoveries in the early 1990s. This thesis investigates the characteristics and distribution of exoplanets, focusing on the progenitors of white dwarfs (WDs). We highlight the challenges associated with detecting exoplanets around more massive stars due to issues such as reduced radial velocity signals, shallower transit depths, and difficulties in direct imaging. Despite these challenges, significant progress has been made in identifying exoplanets around Sun-like and smaller stars using missions like Kepler, TESS, and JWST.

The central aspect of this research is the creation of a comprehensive dataset, i.e. a representative synthetic population of progenitor stars of white dwarfs including orbiting Jupiter mass planets. This population is generated based on the Initial Mass Function (IMF) Kroupa (2001), assuming a constant star formation rate, and the age-metallicity relation (Carrillo et al., 2023). The study also incorporates the planet occurrence rate function by Walthoff et al. (2022) to estimate the likelihood of planet detection based on stellar mass and metallicity.

In the final population of white dwarf progenitors hosting Jupiter mass planets is 6.6 %. Despite being less dominated by low-mass host stars than the full population, most of the planet hosts are still lower mass stars. The population of planet hosts is shifted towards higher metallicity stars and, as a consequence of the age metallicity relation, towards younger ages.

The generated population of white dwarf progenitors forms the base of a population synthesis of Jupiter-mass planets around white dwarfs. To obtain this final goal the obtained samples need to be combined with stellar evolution codes and require to calculate which planets might survive the evolution of the host star into a white dwarf.

Viernes 30 de agosto 2024 a las 11:00 hrs.

- Sala Conferencias Dr. Luciano Laroze, E300