## The 13th Torino Workshop on AGB stars & the 3rd Perugia Workshop on Nuclear Astrophysics



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## Nucleosynthesis and binarity in AGB stars: the Barium star perspective

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A rich zoo of peculiar objects forms when evolved stars with extended and loosely-bound convective envelopes, such as Asymptotic Giant Branch (AGB) stars, undergo gravitational interaction with a binary companion. The stellar, chemical and orbital properties of these peculiar products of binary interactions are essential to understanding the interaction history in such systems and to constraining many physical and chemical mechanisms that concern their giant progenitors.

In the last few years, the combination of long-term radial-velocity monitoring programmes, high-resolution spectroscopy, high-quality Gaia distances, and state-of-the-art stellar models has proven to be very powerful to learn about evolved long-period binaries. During my contribution, I will present the latest observational constraints that we obtained for a family of chemically peculiar stars known as Barium (Ba) stars. These main-sequence and red-giant stars accreted mass from the outflows of a former AGB companion, which is now a dim white dwarf (WD), polluting their atmospheres with material rich in heavy metals. The orbital properties of Ba stars can help us constrain the exact mass-transfer mechanism through which they formed, and their chemical abundances are a tracer of the nucleosynthesis processes that took place inside the former AGB companion.

Additionally, including Hipparcos and Gaia astrometric information in our recipe, we recently determined absolute masses for the invisible WD companions of many Ba stars, obtaining direct information about their AGB progenitors via initial-final mass relationships. I will discuss the orbital parameters of Ba star systems in the context of binary interactions in systems with AGB-star components and the WD masses in the context of AGB nucleosynthesis. Neither binary evolution models nor nucleosynthesis models fully reproduce the orbital and chemical properties of Ba stars, which represents a gap in our knowledge about AGB stars, their outflows, and their interactions with binary companions.

## Session

Stellar observations (photometry and spectrometry)

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