

Stellar Pulsation Models to Pave the Road to the Rubin-LSST Revolution'

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Pulsating stars are pivotal both as primary distance indicators for calibrating the cosmic distance ladder and as reliable stellar population tracers. Their intrinsic variability and the relations between pulsation properties and evolutionary parameters make them excellent probes for studying galactic evolution and star formation. The modeling, both from an evolutionary and pulsation point of view, is crucial to understanding these objects. We have recently computed detailed and homogeneous nonlinear pulsation models for Classical Cepheids (CCs) using the Stellingwerf hydrodynamical code. These models account for variations in chemical composition, the mass-luminosity (ML) relation, and the efficiency of super-adiabatic convection, resulting in accurate predictions of observable quantities such as instability strips, multi-filter light curves, mean magnitudes, and colors. The whole theoretical scenario has been transferred in the Gaia and Rubin-LSST photometric systems. By combining pulsation predictions with self-consistent evolutionary models, we have also derived accurate metal-dependent Period-Age and Period-Age-Color relationships.

This framework has been applied to investigate a sample of Galactic Cepheids from Gaia Early Data Release 3 (EDR3) to constrain, e.g., the Cepheid age distribution.

These analyses are integral in our SPECTRUM project whose main aim is to develop a synergy between stellar pulsation and evolution models to allow an important step forward in stellar astrophysics.

sessioni congresso

Stelle, popolazioni stellari e mezzo interstellare

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