

RR Lyrae, Cepheids and LBVs to constrain theory using LSST

LSST will allow us to shed new light on the physics of stellar variability through the comparison between observed and predicted PL, PLC relations and light curves.

Scientific aims:

- ❖ To constrain the physical and numerical assumptions of evolutionary and pulsation models;
- ❖ To disentangle the contributions of mass loss, overshooting and other non canonical phenomena and to help improving the treatment of convection;
- ❖ To evaluate the helium abundance and the helium to metal enrichment ratio.

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LSST will significantly increase the number of confirmed Luminous Blue Variables (LBV) and allow us to accurately determine :

- i) the length of the LBV phase;
- ii) the location of these stars in the HR diagram;
- iii) the total amount of mass lost, either in total and per eruption, as a crucial ingredient in our understanding of the final fate of massive stars, as well as of the interstellar medium chemical enrichment.

On this basis LSST will be crucial

- ❖ To constrain the physical and numerical assumptions of massive stars evolutionary models through the comparison with the LBV properties observed by LSST.

Partecipanti e relative responsabilità/interessi

Cepheids and RR Lyrae and LBV

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Conessioni con osservazioni di altre *facilities*

- Gaia → LSST is the complement of Gaia extending its capabilities to 5 magnitude fainter (many of us already involved in Gaia DPAC CU7)
- VMC@VISTA → LSST will allow us to extend our knowledge of Cepheids and RR Lyrae in the MCs to other Local Group galaxies (the PI and some collaborators are involved in this survey)
- JWST → the synergy between LSST and JWST is crucial for the calibration of the extragalactic distance scale in the near and mid infrared bands (some members of the team are involved in a ERS)
- E-ELT → The overlap in time between the two experiments means that E-ELT with its AO facilities will provide the spectroscopic follow up (radial velocities; chemical abundances) down to the limiting magnitude of the LSST catalog (Scientific cases planning in progress)

Tipo di analisi dati prevista/necessaria, inclusa di sviluppo e cadenza temporale

For Cepheids and RR Lyrae, we need multi band time-series data with at least 20 phase points in g (and a consequent larger number of phase points in r and i according to the LSST plan).

It would be useful to rely on a previous identification and possibly on known periods, mean magnitudes and amplitudes.