Asteroseismology of TESS Luminaries in the PLATO Era

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The NASA Transiting Exoplanets Survey Satellite (TESS) is delivering high-precision photometry for millions of stars. The upcoming PLAnetary Transits and Oscillations of stars mission (PLATO) will provide long-duration, high-precision photometry of tens of thousands of bright stars to be characterised through asteroseismology. A key innovation of PLATO is its fully automated seismic pipeline, which will, for the first time, systematically extract oscillation frequencies for such a large stellar sample. Ensuring the reliability of this pipeline requires well-characterised reference stars spanning a wide range of evolutionary stages and physical properties.

In this presentation, I will focus on a subset of 32 bright main-sequence and subgiant stars from the TESS Luminaries Sample that lie within PLATO's long-duration observation fields. These nearby, bright solar-like oscillators offer a rare opportunity to probe stellar interiors with high precision and to test models of stellar structure and evolution across key evolutionary stages. Using TESS data up to Sector 88, we extracted and validated individual oscillation mode parameters with three independent pipelines, ensuring robust seismic measurements. We therefore report precise global seismic parameters, providing strong constraints on their internal structure, evolutionary state, and fundamental properties. They should rank among the highest-quality seismic targets observed by PLATO. Our results show overall consistency with previous studies while revealing current limitations in mixed-mode identification in subgiants, highlighting the need for longer time-series observations. These stars thus serve both as astrophysically valuable laboratories and as a key reference set for PLATO, enabling early calibration and optimisation of its asteroseismic analysis and helping secure the mission's scientific return.