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Mind the gaps: a massive empirical approach to high-mass stellar evolution with the aid of IACOB, WEAVE, Gaia and TESS

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IACOB is an ambitious long-term observational project which is contributing to the so-called new era of investigation of massive stars by concentrating on Galactic OB stars. More specifically, the main scientific goal of the project is to provide a complete empirical overview of the physical properties of a statistically significant sample of Galactic OB stars. In particular, the ultimate driver of the project is that the compiled information can be used as a strong and long-lasting empirical anchor point for our theories of stellar atmospheres, winds, interiors and evolution of massive stars. In this endeavor, we are benefiting from: (a) optical, high-resolution spectroscopic instruments attached to 1-5-m telescopes, mostly in the Canary Islands observatories; (b) state-of-the-art tools and techniques to perform single snap-shot and multi-epoch quantitative spectroscopic analyses (providing accurate estimates for the stellar/wind parameters, rotational velocities, abundances, as well as information about stellar phenomena giving rise to spectroscopic variability/peculiarity such as binarity, pulsations, rotational modulation, peculiar emission and/or wind variability); (c) parallaxes and proper motions provided by the Gaia mission; and (d) high-cadence, uninterrupted photometry provided by the TESS mission.

In this talk, I will provide an overview of how the incorporation of Gaia data to the IACOB project is helping us to solve some of the long-standing questions and problems about the first stages of evolution of stars born with masses in the range between 15 and 80 M_{\odot} . Special emphasis will be put in the critical importance of supporting Gaia observations with ground-based spectroscopic surveys to be able to investigating stellar evolution along the upper right region of the HRD with Gaia.

Presenter: SIMON-DIAZ, S.

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