Peak Bagging of red-giant oscillation spectra using Reinforcement Learning

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Red-giants (RGs) exhibit mixed dipolar modes of oscillations, which are highly sensitive to the internal structure and dynamics of their cores – rendering them excellent astrophysical laboratories for probing physical phenomena like differential rotation, internal magnetic fields. Despite the availability of an extensive sample of RGs observed by the Kepler telescope and the anticipated influx of additional data from missions such as TESS and the forthcoming PLATO —the full scientific exploitation of these datasets remains constrained by the conventional methods, which require substantial computational time and resources for detailed analysis. In this talk, I will demonstrate how we leverage advanced deep learning techniques, including supervised learning and reinforcement learning, to automate and accelerate the process of peak bagging to the observed oscillation spectra of RGs without the need for explicit human intervention and smaller number of iterations, thereby reducing the CPU hours required for analysis of each star.