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Survey of Surveys: Homogenizing Stellar Parameters Across Surveys with Symbolic Regression

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Large astronomical surveys play a significant role in modern astrophysics, providing extensive datasets for various studies, i.e. stellar populations and galactic evolution. However, systematic discrepancies between spectroscopic surveys—arising from differences in instrumentation, spectral coverage, and analysis techniques—pose significant challenges for studies that rely on data from multiple catalogs and for reconciling conclusions drawn from different sources. In this context, I am working on a unified catalog of stellar parameters from large spectroscopic surveys such as APOGEE, LAMOST, and GALAH. To identify and correct these biases, I am exploring symbolic regression, a transparent machine learning approach, and comparing it with traditional polynomial fitting. The goal is to provide a more accurate and consistent set of stellar parameters that can be used across different surveys. While this work is ongoing, I will present preliminary results and discuss the challenges of balancing model accuracy with generalization.

Presenter: AVDEEVA, Aleksandra (Istituto Nazionale di Astrofisica (INAF))

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