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Studying lithium-rich stars through population synthesis

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The study of how elements form and evolve in stars is a critical question in modern astrophysics. Lithium (Li) was produced in big bang nucleosynthesis (BBN) and is easily destroyed in the first dredge-up (FDU), which leads to a dramatic drop in Li abundance on the stellar surface. However, a small fraction of giant stars still maintain a substantial quantity of lithium in their atmospheres after the FDU. Although several mechanisms have been proposed to explain this phenomenon, the truth remains unrevealed. In this talk, I will present the use of two neural networks to separately predict the Li normal behaviour as a function of asteroseismic information and observational parameters in red giants. The next step will be developing a comprehensive and complete population synthesis model to predict normal lithium production in giants and explore how different physical processes individually contribute to Li enrichment across stellar populations. By incorporating multiple enrichment pathways into our simulations, I aim to quantify their relative importance and improve our understanding of the conditions that lead to Li-rich giants. Leveraging data from large-scale spectroscopic surveys and asteroseismic surveys, this model will be robust for the identification and further studies of Li-rich stars in the future.

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