From Isochrones to Isotopes: A New Chemical Approach to Dating Galactic Open Clusters



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Abstract: Abstract: Accurate age determinations of Galactic open clusters are essential for tracing the chemical and dynamical evolution of the Milky Way disk. In this talk, I will present an overview of the primary methodologies used to clock these stellar systems, highlighting their strengths, limitations, and recent advancements. I will start with classical photometric isochrone fitting and discuss how this method has been recently renewed through the integration of machine learning algorithms. I will then examine independent, model-sensitive diagnostics, specifically focusing on ages derived from asteroseismic oscillations and eclipsing binary systems. Moving to spectroscopic techniques, I will review chemical clocks, starting from the well-established lithium depletion boundary and introducing a novel chemical age diagnostic I have developed based on carbon and oxygen isotopic ratios ($^{12}C/^{13}C$ and $^{16}O/^{17}O$) in red giant stars. Finally, I will show practical comparisons of ages obtained across these different methods for benchmark open clusters, discussing systematic offsets and the potential of combining multiple diagnostics to achieve robust, high-precision cluster chronologies

On-line

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