Influence of Carbon in Star Spectra

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Populations of stars in galaxies can tell us about how those galaxies evolved over time. Elements heavier than hydrogen and helium are produced in stars and stellar explosions, leading to an increase in abundances of these heavier elements in stars formed in later cosmic cycles. Measurements of element abundances in individual stars and in integrated light from galaxies requires accurate spectral models. Carbon influences both atmospheric structures of stars and their emergent spectra. A previous postgraduate project led by this supervisor resulted in new stellar libraries of theoretical star spectra (Knowles et al. 2021, MNRAS, 504, 2286), including variations in carbon and its effects on spectra through atomic and molecular features.

This current project is to create a library of semi-empirical star spectra with different carbon abundances, based on both observations and our new theoretical models of star spectra. The student will use these to explore how carbon affects spectra of stars and what the signatures of carbon are in the integrated light from populations of stars. Such models are important for measuring element abundances across the Universe. Skills in programming (particularly python) and an interest in spectroscopy are required for this project.

For more information on this project please contact Dr. A.E. Sansom (AESansom@uclan.ac.uk).
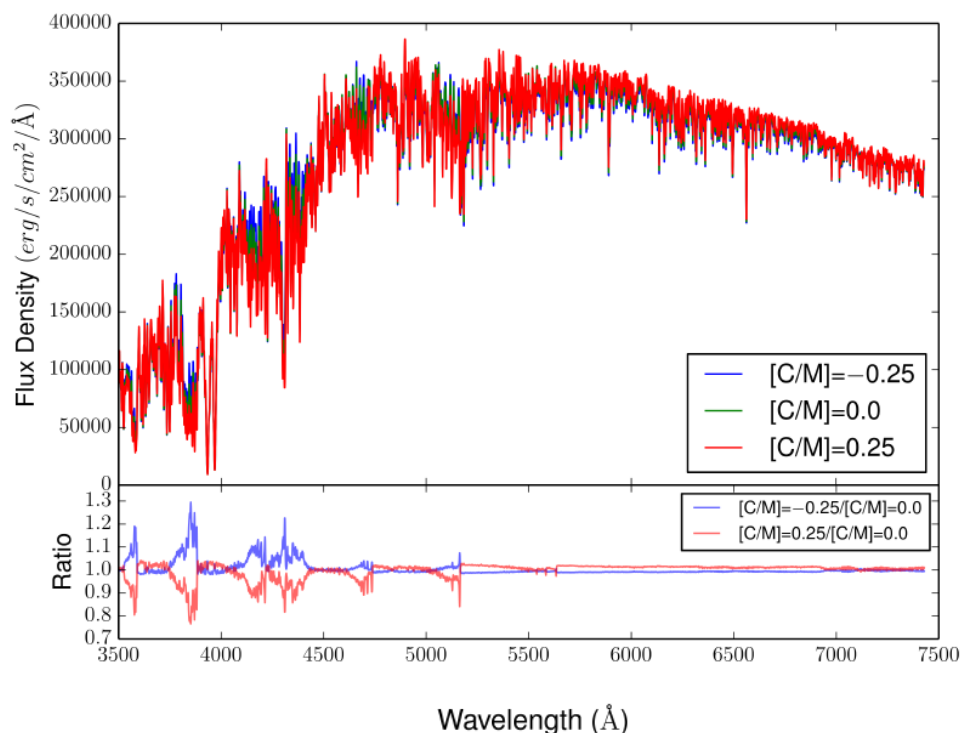

Figure showing theoretical star spectra with different carbon abundances and how this shows up clearly in ratios of spectra (Knowles 2019, PhD thesis, UCLan).