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Stellar Archaeology with the NOT

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Stellar archaeology seeks to use information gathered from old, metal-poor stars (pop II stars) in the Milky Way and its satellites to place constraints on the first generation of stars to form in the Universe (pop III stars), which we can no longer directly observe. I will present the results of two observing campaigns carried out with the NOT (and other similar sized telescopes). The first project aims to determine the binary nature of a sample of chemically peculiar metal-poor stars. When using the abundance pattern of metal-poor stars to investigate nucleosynthesis channels in the early Universe, it is vital to verify that the abundances reflect the star's birth cloud and have not been altered by mass transfer from a binary companion. To this end, we monitored a sample of 63 stars over eight years with the NOT collecting over 900 FIES spectra. Resulting in binary frequencies being determined for three types of chemically peculiar stars; CEMP-s, CEMP-no, and *r*-process enhanced stars. The second campaign is part of the *R*-Process Alliance (RPA) which seeks to constrain the nature and astrophysical site of the rapid neutron-capture process. The first phase of this project focuses on increasing the sample of metal-poor stars exhibiting large enhancement in *r*-process elements for which detailed abundances can be derived.

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