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# Reliable stellar abundances of individual stars with the MUSE integral-field spectrograph

We present a novel approach to determine stellar parameters from stars observed in MUSE fields making use of data driven machine learning methods. Taking advantage of the comparable spectral properties (resolution, wavelength coverage) of the LAMOST and MUSE instruments, we adapt the Data-Driven Payne model used on LAMOST observations and apply it to stars observed in MUSE fields. We find that we are able to determine stellar parameters to better than 100K in Teff, 0.15 dex in log(g), and 0.1 dex in several abundances ([Fe/H], [Mg/Fe], [Si/Fe], etc) for current MUSE observations. MUSE is unique in its ability to study dense star fields such as globular clusters or the Milky Way bulge, and our methods allow automated determination for all stars in a given field. With the upcoming BlueMUSE instrument, we gain access to a whole new range of chemical abundances, especially critical s-process elements such as [Y/Fe] and [Ba/Fe] which provide key age diagnostics for stellar targets. Our methods will also enable MUSE, in combination with adaptive optics to provide instrument construction guidance for future ELT telescope.

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