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Differences in chemical enrichment of metal-poor Milky Way stars

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The relative variations of the chemical compositions between metal-poor stars ($[\mathrm{F/H}] < -1$) give the possibility to reveal the pure signature of unique nucleosynthesis processes. The study of the r-process is for instance one of the main goals of stellar archaeology.
In this work we present the atmospheric parameter, the main dynamic properties and the abundances of four metal-poor stars: HE 1523–0901, HD 6268, HD 121135, and HD 195636 ($-1.5 > [\mathrm{Fe/H}] > -3.0$]).The abundances are derived from spectra obtained with the HRS echelle spectrograph at the Southern African Large Telescope, using both LTE and NLTE approaches, with an average error between 0.10 and $0.20\,\mathrm{dex}$. The most metal-poor stars in our sample, HE 1523–0901, HD 6268 and HD 195636, show anomalies that are better explained by supernova models from fast-rotating stellar progenitors. If we consider the elements beyond Fe, HE 1523-0901 can be classifed as an r-II star, HD 6268 an r-I candidate, and HD 195636 and HD 121135 show a borderline r-process enrichment between limited-r and r-I star. Significant differences are observed between the r-process signatures in these stars. We discuss those in the light of the current understanding of r-process nucleosynthesis.

Primary authors: MISHENINA, Tamara (Astronomical Observatory Odesa National University Ukraine); PIGNATARI, Marco (Konkoly Observatory, HUN-REN, Konkoly Thege Miklos ut 15-17, H-1121 Budapest, Hungary); USENKO, Igor (Astronomical Observatory Odesa National University Ukraine); SOUBIRAN, Caroline (aboratoire d'Astrophysique de Bordeaux, Univ. Bordeaux, CNRS, B18N, allee Geoffroy Saint-Hilaire, 33615, Pessac, France); THIELEMANN, Friedrich-Karl (GSI Helmholtzzentrum fur Schwerionenforschung, Planckstrasse 1, D-64291 Darmstadt, Germany); KNIAZEV, Alexei (Southern African Large Telescope Foundation, South African Astronomical Observatory, P.O. box 9, 7935 Observatory,\\ Cape Town, South Africa); KOROTIN, Sergey (Crimean Astrophysical Observatory, Nauchny 298409, Republic of Crimea); GORBANEVA, Tatiana (Astronomical Observatory Odesa National University Ukraine)

Presenter: MISHENINA, Tamara (Astronomical Observatory Odesa National University Ukraine)

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