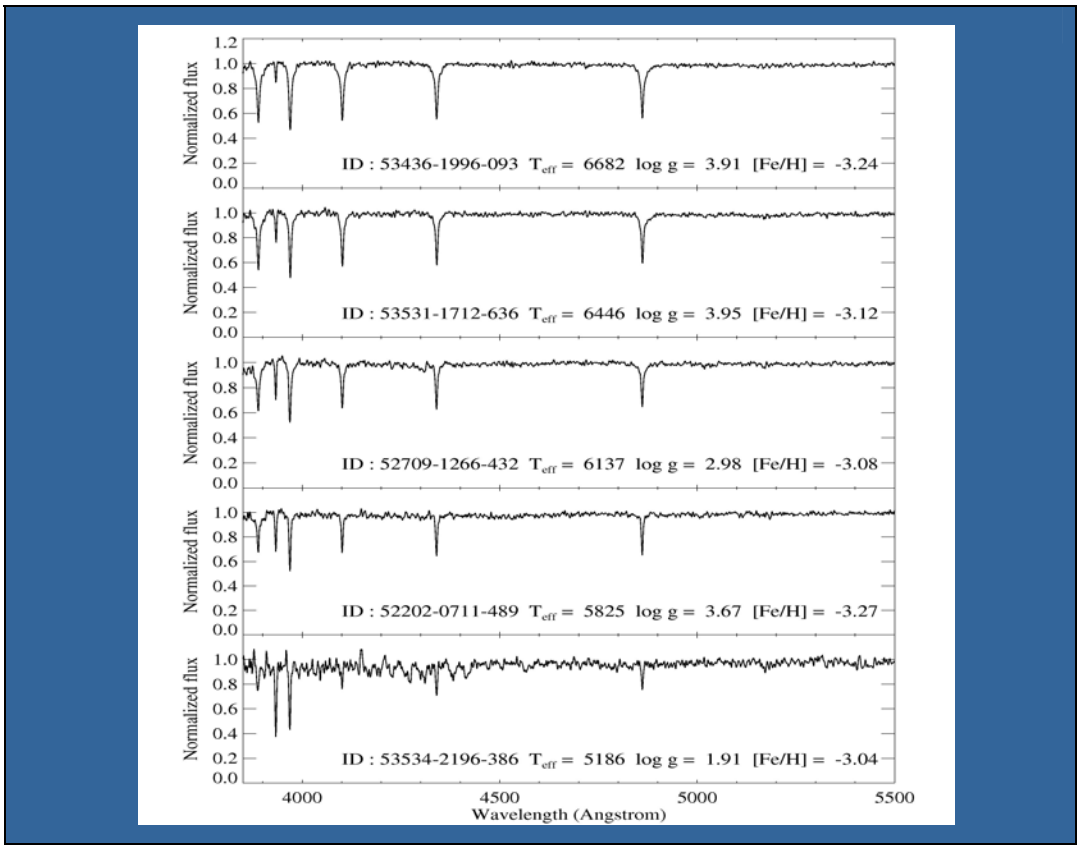
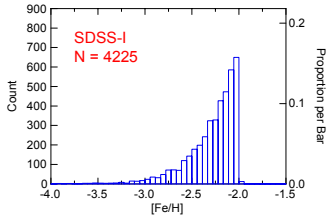
The Joint Institute for Nuclear Astrophysics

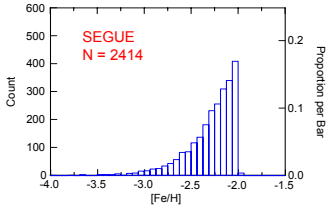
The Most Metal-Poor Stars in the Galaxy Revealed by SEGUE

JINA scientists, and other astronomers within the Sloan Digital Sky Survey (SDSS-II) program SEGUE (Sloan Extension for Galactic Exploration and Understanding) are in the process of identifying and analysing the most metal-poor, and by inference, oldest stars in the halo of the Milky Way. Candidate metal-poor stars are identified first on the basis of their colors, which are generally bluer than more metal-rich stars, such as the Sun.

The figure below shows sample spectra (with continuum removed) for stars from SEGUE having metallicities less than 1/1000th of the solar abundance. The only strong metalliic line seen, due to Calcium, is marked in red. The other lines are due to Hydrogen.







The figures above show the distribution of metallicities ([Fe/H]) for a total of over 6000 stars from the SDSS-I and the ongoing SEGUE surveys with [Fe/H] below 1/100th the solar metallicity. This number is more than DOUBLE the total of all previous such discoveries. The shapes of these distributions strongly constrain the nature of the very first stars to have formed in the universe.

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2007