# GHOST SV Observation Evaluation Form

## Title: Galactic Metal-Poor Stars

## Program ID: GS-2023A-SV-101

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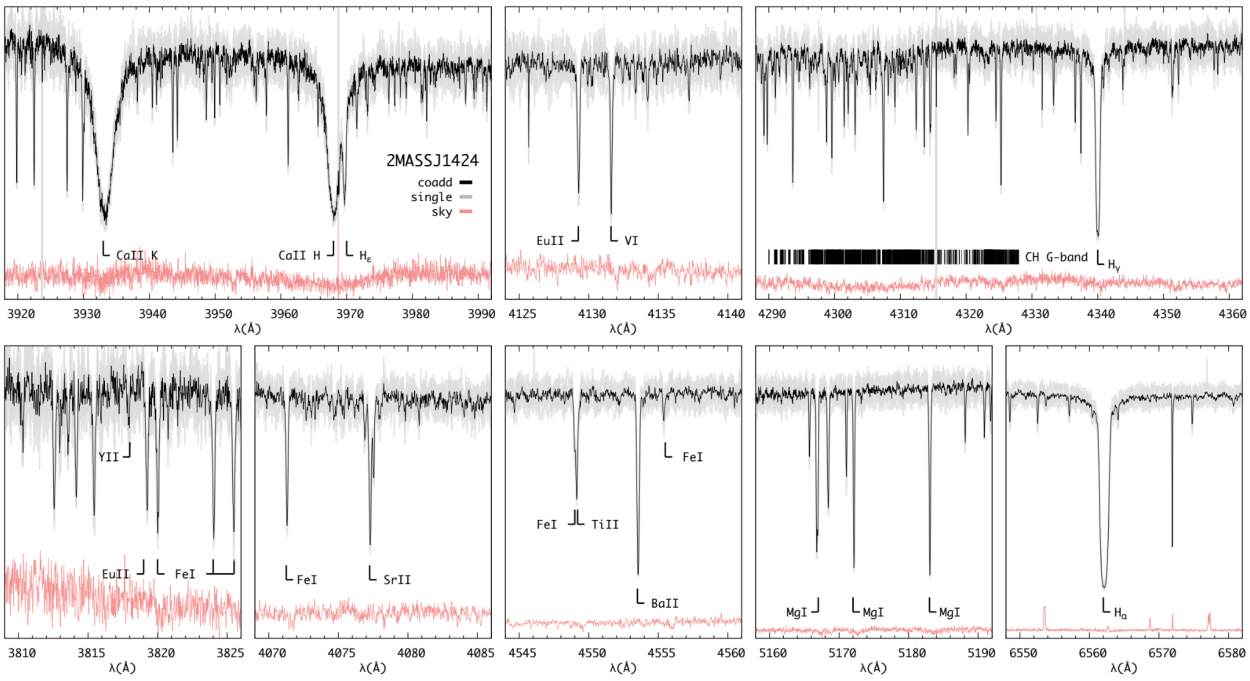
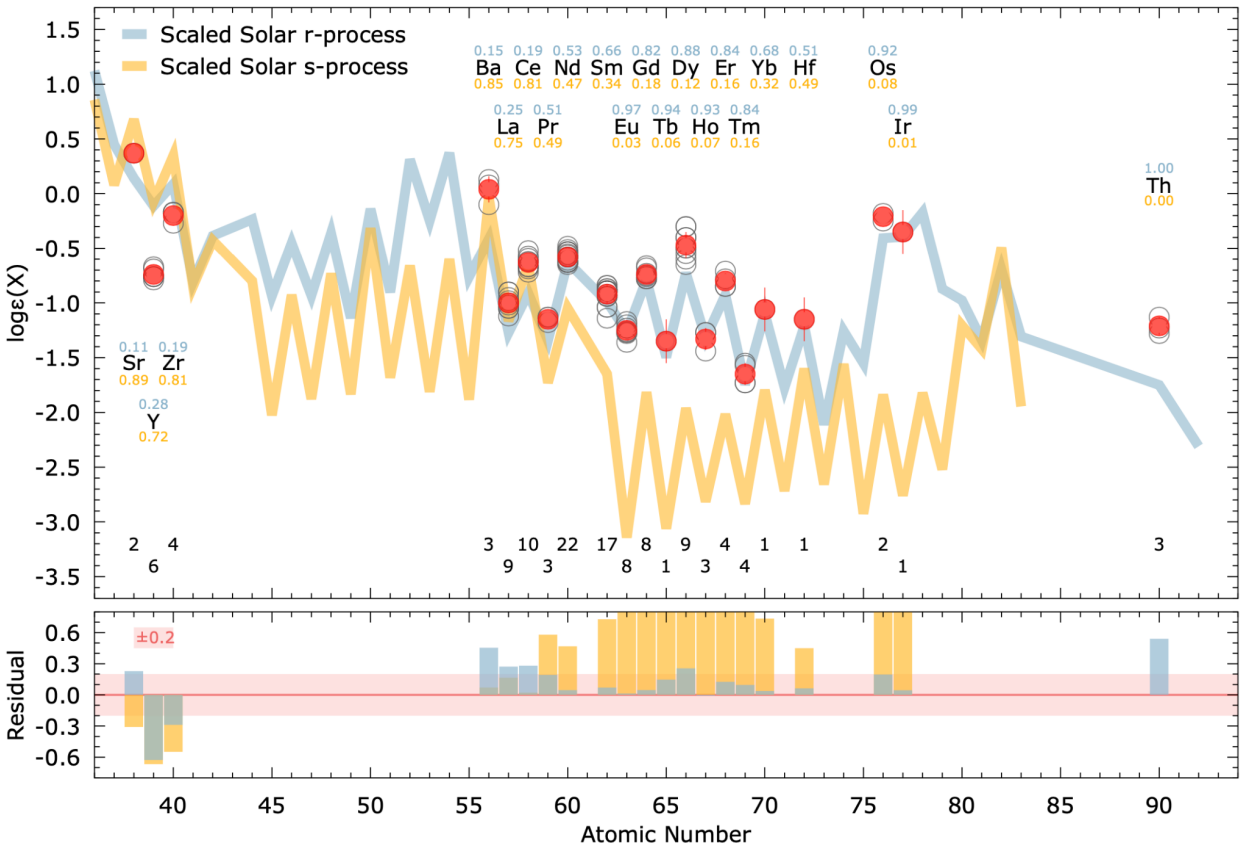
## Description of the primary goals and the main findings

The main goal is to determine the chemical abundance patterns of an extremely metal-poor star ([Fe/H]<-3) with low carbon enhancement. This star (J1424) was identified from S-PLUS (narrow-band photometry) and followed up with medium-resolution spectroscopy using Gemini/GMOS. With a set of chemical abundances measured, in particular for lighter elements (Z<30) it will be possible to confirm their low-metallicity status and also compare their abundance pattern with yields from zero-metallicity faint supernova models available in the literature. These can help constrain the progenitor population for this star. Moreover, J1424 has excellent Gaia parameters, allowing for a chemodynamical analysis, which can further constrain its origin.




Further inspection of the GHOST data revealed that J1424 is also enhanced in elements formed by the rapid neutron capture process (r-process). It was possible to measure abundances for 21 species with Z>=38, including the actinide element thorium. The figure below shows a comparison between the heavy

element abundance pattern of J1424 compared with the normalized Solar System values for the r-process and s-process. The agreement supports the hypothesis that this star was formed from a gas cloud that was previously enriched by an r-process forming event, such as the explosive aftermath of a neutron star merger.




## Additional comments on GHOST performance:

I did not have a previous high-resolution spectrum for this star, but the resolution provided by the SR mode is perfect for this type of research and the data in on par with similar instruments (UVES, MIKE).

## Suggestions for improvements:

OT: I don't know if this needs to be changed, but perhaps always remind the PIs and observers that multiple observations can be defined both in the GHOST component (then all will be part of a bundle) or in the "observe" component. The latter was beneficial in my case because the QC could fit smaller blocks in the queue on multiple nights instead of just one large block.
DRAGONS: for this program the data reduction was very straightforward. The installation instructions were clear and the steps well-explained.