



Contribution ID: 185

Type: **Poster**

Exploring Supernova signatures in time-resolved records from the Atacama Desert, Chile

Monday 16 September 2024 20:15 (20 minutes)

The detection of cosmic signatures in deep-sea, ice, and lunar samples has made an important contribution to nuclear astrophysics in recent years. In particular, ^{60}Fe from near-Earth supernovae has been imprinted during the time periods 2 – 3 and 7 – 8 Myr ago.

This data corroborates theoretical studies that suggest that more than 10 SNe exploded at a distance of 50 – 150 pc over the last 10 – 15 Myr. Their overriding shock fronts created a volume of hot gas that is seen in observational data and referred to as the ‘Local Bubble’, which currently engulfs our Solar System.

We here explore for the first time sedimentary records on land, in particular from the oldest and driest desert on Earth; the Atacama Desert, Chile. In contrast to previous archives, Atacama Desert deposits are easily accessible, reach more than 10 Myr into the past and are not affected by continuous aqueous diffusion.

The low sedimentation rates in the Atacama Desert that are similar to deep-sea sediments, as well as the hyper-arid conditions facilitate the preservation of cosmic traces over millions of years, bearing the potential for the detection of individual supernovae within each of the broad signals.

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Session Classification: Poster Session