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Search for Supernova-produced ^{60}Fe in Antarctica Tracing the Local Interstellar Cloud

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The presence of long-lived radionuclides provides insights into the solar system's history. The radionuclide ^{60}Fe ($t_{1/2}$ = 2.6 Myr) is mainly synthesized in massive stars and subsequently ejected by supernovae. Embedded into dust grains, ^{60}Fe can enter the solar system and be deposited into terrestrial archives, where it evidences stellar explosions even after several million years.

Expanding upon the discovery of increased levels of ^{60}Fe in million year old deep-ocean material and a recent influx into Antarctic snow, we now aim to investigate the influx pattern in the unexplored time interval 50 – 80 kyr before present. A 300 kg sample of the Antarctic EPICA Dronning Maud Land (EDML) ice core was selected to probe the recent ^{60}Fe influx and implications for the formation of the Local Interstellar Cloud. Benefiting from their remoteness, Antarctic ice cores offer a unique geological archive with minimal terrestrial contamination.

The ultra-low deposition of a few ^{60}Fe atoms per cm^2 per year can only be investigated by accelerator mass spectrometry. The DREAMS facility (HZDR) was used to measure the cosmogenic radionuclides ^{10}Be, ^{26}Al and ^{41}Ca, whereas HIAF (ANU), as the sole capable facility worldwide, is required for measurements of ^{53}Mn and ^{60}Fe. We report on the recent results of this project.

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