Direct detection of LIVE $^{60}$Fe and $^{244}$Pu on earth as a monitor for recent heavy-element nucleosynthesis

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Observation and detection of freshly produced radionuclides provides a direct clue for understanding stellar nucleosynthesis. The Solar System travels through the interstellar medium collecting dust particles and direct ejecta from stellar events. Previous measurements in terrestrial archives for $^{60}$Fe ($t_{1/2}=2.6$ Ma) at TU Munich [1] and for $^{244}$Pu ($t_{1/2}=81$ Ma) at TUM [2], Hebrew Univ. [3] and VERA, Vienna [4] applied accelerator mass spectrometry (AMS), the most sensitive technique for counting the expected small traces.

Search of live interstellar $^{244}$Pu can place strong constraints on recent r-process frequency and production yield. We will present new data suggesting much lower abundances than expected from continuous production in Supernovae (SNe).

Recently, we have started a program at the ANU to follow-up a discovery of a $^{60}$Fe excess pointing to a close-by SN [1], leading to an exceptional sensitivity of $^{60}$Fe/Fe ~$10^{-16}$. We searched for a SN-signal in 3 deep-sea sediment cores. We will present first data for $^{60}$Fe allowing high time resolution and will relate it to potential recent SNe.

In addition, we have re-measured with an independent method the $^{60}$Fe half-life via AMS that allows us to address a previous large discrepancy [5,6].