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

Anton Wallner[1], Max Bichler[2], Thomas Faestermann[3], Jenny Feige[4], L. Keith Fifield[1], Robin Golser[4], Gunther Korschinek[3], Walter Kutschera[4], Silke Merchel[5], Michael Paul[6], Georg Rugel[5], Dorothea Schumann[7], Johannes Sterba[2], Steve Tims[1] and Stephan R.Winkler[4]

[1] *Department of Nuclear Physics, Australian National University, Canberra, Australia*
[2] *Atominstitut, Vienna University of Technology, Vienna, Austria*
[3] *Technische Universität München, D-85747 Garching, Germany*
[4] *VERA Laboratory, Faculty of Physics, University of Vienna, Austria*
[5] *DREAMS, Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany*
[6] *Racah Institute of Physics, Hebrew University, Jerusalem, Israel*
[7] *Paul Scherrer Institute (PSI), Villigen, Switzerland*

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].

[1] K. Knie et al., PRL93 (2004), C. Fitoussi et al., PRL101 (2008).
[2] C. Wallner et al. New Astr.Rev.48 (2004)
[3] M. Paul et al, ApJL558 (2001)
[4] A. Wallner et al., submitted
[5] G. Rugel et al., PRL103 (2009)
[6] W. Kutschera et al., NIM B5 (1984)