

Seminar general

A New Search for supernova r-process actinides on Earth

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The cosmic site wherein the heavy elements from mass 70 up through to the long-lived actinides remains an unsolved mystery in astrophysics. These elements are produced through a process of rapid, successive capture of neutrons on an initial seed abundance of stable nuclei – the so-called r-process. Competing theoretical hypotheses suggest core collapse supernovae (CCSN) and/or merging binary neutron stars as the site(s) in which these elements are made, but there remains no empirical evidence to conclusively demonstrate either as an r-process site. Recent findings of ^{60}Fe (half-life 2.6 Myr) on Earth and in lunar regolith show that between 2.6 and 1.7 Myr before the present, our solar system received freshly synthesized material from a CCSN. If CCSN are indeed a site of the r-process, long-lived actinides such as ^{244}Pu and ^{247}Cm could be present in geological reservoirs coincident in time with the ^{60}Fe signal. This talk will give an introductory overview of the status of the ^{60}Fe searches and the present empirical state of the art hints of actinide production in CCSN, from which a description of our new and present r-process actinide search will follow.

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Sala de seminar Marius Petrașcu, DFN - TANDEM