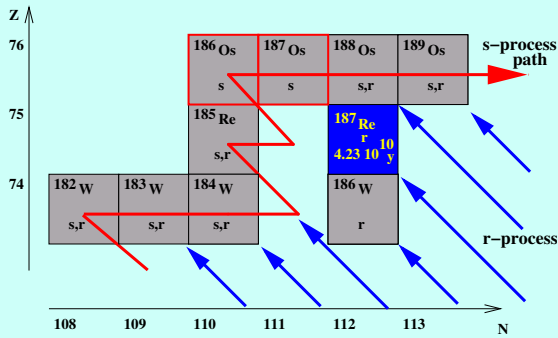


Re/Os cosmo-chronometer



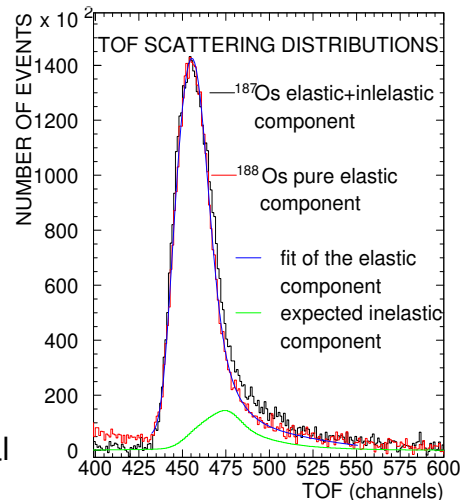
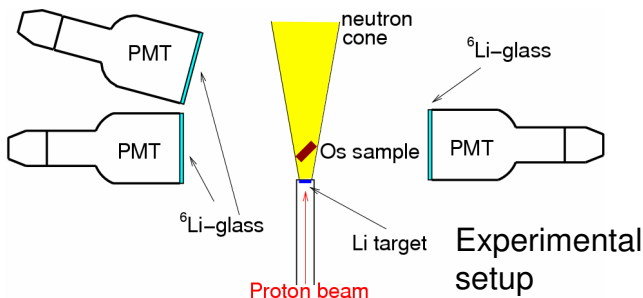
- The ^{187}Re β -decay ($t_{1/2}=42$ Gy) is suited for dating the onset of r -process
- A model of galactic chemical evolution is necessary, but not the knowledge of the primary r -process yields
- Being ^{187}Os and ^{186}Os generated only by s -process, their s -abundances are correlated with the respective stellar **(n, γ) cross sections** ($\sigma N = \text{const}$), thus the radiogenic contribution to ^{187}Os abundance, N^{rad} , can be separated:

$$N_{^{187}\text{Os}}^{\text{rad}} = N_{^{187}\text{Os}}^{\text{solar}} - \frac{\sigma_{^{186}\text{Os}}(n, \gamma)}{\sigma_{^{187}\text{Os}}(n, \gamma)} N_{^{186}\text{Os}}^{\text{s-process}}$$

- At stellar temperatures, the **first excited level at 9.75 keV of ^{187}Os** is more populated than the ground state, thus the laboratory cross section has to be corrected by theoretical calculations: the measurement of the **inelastic scattering cross section** for this level allows to define the competition by the scattering channels under stellar conditions.

Inelastic scattering cross section of ^{187}Os at 3.7 MV FZK Van de Graaff

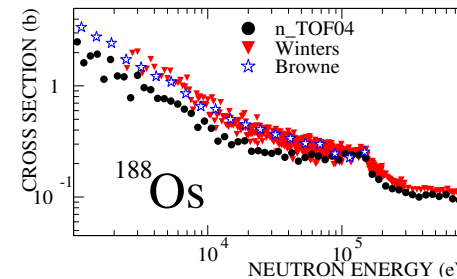
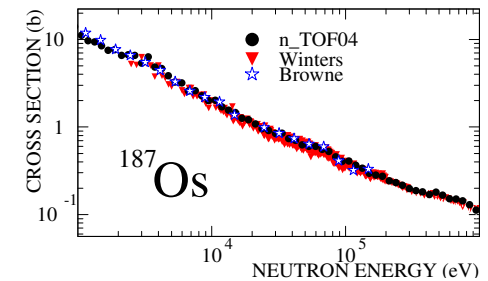
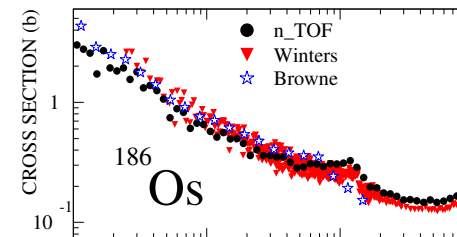
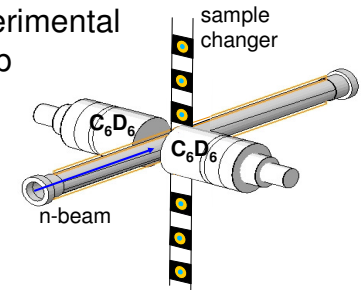
- Neutrons by $^7\text{Li}(p,n)^7\text{Be}$ reaction at threshold
- Gaussian neutron distribution at 30 keV
- FWHM less than 10 keV
- Time of Flight technique
- n-detection : ^6Li -glass scintillators



$^{186,7,8}\text{Os}$ (n, γ) cross sections at the CERN n_TOF facility

- Neutrons by spallation on lead
- Energy range 1 eV – 1 MeV
- Time of Flight technique
- γ -ray detection: C_6D_6 scintillators
- Pulse Height Weighting Technique
- ^{188}Os cross section measured for isotopic correction

Experimental setup



A slightly smaller stellar ^{186}Os cross section implies a consequently larger radiogenic contribution to ^{187}Os abundance

→ the estimated age of the universe increases slightly

Ausgewählte Publikationen

M. Mosconi, A. Mengoni, M. Heil, F. Käppler, G. Aerts, R. Terlizzi and the n_TOF collaboration, *Neutron capture cross sections for the Re/Os clock*; Proceedings of the International conference on nuclear data for science and technology 2004, Santa Fe 1335-1338(2004)

Ausgewählte Vorträge

n_TOF meeting 2003, Vienna, Austria, 10-12.12.2003, *Tests on BaF crystals*
DPG-Tagung, Köln, 8-12.03.2004, *A measurement of the neutron capture cross sections of ^{186}Os , ^{187}Os and ^{188}Os*
International conference on nuclear data for science and technology, Santa Fe, New Mexico, 26.9.04-1.10.04, *Neutron capture cross sections for the Re/Os clock*
n_TOF meeting 2004, CERN, 10-12.12.2004, *n_TOF04 status of the analysis*