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Experimental challenges for the Re/Os clock

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The stellar neutron capture cross sections of 186Os and 187Os are fundamental for the Re/Os cosmo-chronometer for defining the s-process abundance of 187Os. Subtraction of the s component from the solar 187Os abundance yields the radiogenic contribution to 187Os due to the beta-decay of 187Re (t1/2=42.3 Gy) since the onset of r-process nucleosynthesis. The laboratory cross section of 187Os requires a significant correction for the effect of low-lying excited state at 9.75 keV, which is strongly populated under stellar conditions. This theoretical correction can be improved by an experimental cross section for inelastic scattering to the 9.75 keV state. High resolution time-of-flight measurements of (n,gamma) cross sections of 186,187,188Os from 1 eV to 1 MeV at CERN n_TOF facility are reported. The inferred stellar cross sections differ from previously recommended values. In addition, the inelastic scattering cross section has been measured at 30 keV neutron energy via time-of-flight at the Karlsruhe 3.7 MV Van de Graaff. The implications of these results for the Re/Os clock are discussed

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