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Neutron Capture Cross Sections of S-process Branch-Point Nuclei

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At certain locations in the s-process path, there are unstable nuclei with beta-decay rates comparable to the neutron capture rates. This opens up a new possible pathway for the s-process: instead of just undergoing beta decay, the radioactive nucleus could also survive long enough to capture a neutron. Hence, the s-process splits into two branches; these special cases are called s-process branch-point nuclei and they are of special interest because they provide information on the stellar neutron density at the s-process site [1]. On the other hand, they are problematic because their (n, γ) cross section is usually not accessible via direct measurements. Three such branch-point nuclei are addressed in this project: ^{185}W , ^{186}Re and ^{186}Os , which are of particular interest due to the Re-Os cosmochronology: the $^{187}\text{Re} - ^{187}\text{Os}$ pair may be used as a cosmochronometer to determine the duration of the stellar nucleosynthesis before our solar system as formed [2]. However, the existence of the above mentioned branch-points induces complications[3]. Hence an improved determination of the (n, γ) cross-sections for these nuclei is essential. In this conference I will present the newly determined cross-sections of $^{184}, ^{185}, ^{186}\text{W}(n, \gamma)$ reactions which have been constrained using the experimental nuclear level densities and photon strength functions of $^{185}, ^{186}, ^{187}\text{W}$ nuclei. These statistical nuclear properties were measured at the cyclotron laboratory of Oslo using $^{186}\text{W}(d, X)$ reactions (where $X = p, d, t$) and beam energy of 13 MeV.

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No

Level for award (Hons, MSc, PhD, N/A)?

N/A

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

No

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