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Impact of Experimentally Constrained Nuclear Level Density and Photon Strength Function of \(^{182}\)Hf on the Nucleosynthesis Puzzle of \(^{182}\)Hf

The Nuclear level density and \(\gamma\)-ray Strength Function are primary ingredients for astrophysical reaction rate calculations based on the Hauser-Feshbach approach. These parameters need to be well understood to improve our understanding of \(^{182}\)Hf production in astrophysical environments. The new experimentally constrained \(\gamma\)SF and NLD in \(^{181,182}\)Hf were extracted, using the Oslo method first-order phase transition. In particular, a \(^{181}\)Ta(d,X), at 15 MeV experiment was conducted at Oslo cyclotron in which the NaI(Tl) and silicon detectors were used to detect \(\gamma\)-rays and \(\alpha\) particles. The particle coincidence events were used to extract NLDs and \(\gamma\)SF of \(^{179,180}\)Hf from which those of \(^{181,182}\)Hf were inferred. Based on these experimental results the Maxwellian averaged (n, \(\gamma\)) cross-sections of \(^{180}\)Hf(n,\(\gamma\)) and \(^{181}\)Hf(n,\(\gamma\)) reactions were computed with the TALYS reaction code. These results can be used to shed some light on the nucleosynthesis puzzle of \(^{182}\)Hf.

Apply to be considered for a student ; award (Yes / No)?

Yes

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

MSc

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