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PSF in 181,182Ta and the emergence of the scissors resonance

Relatively small resonances on the low-energy tail of the giant electric dipole resonance such as the scissors or pygmy resonances can have significant impact on reaction rates. These rates are important input for modelling processes that take place in astrophysical environments and nuclear reactors. Recent results from the University of Oslo indicate the existence of a significant enhancement in the photon strength function for nuclei in the actinide region due to the scissors resonance [1]. Further, the M1 strength distribution of scissors resonances in rare earth nuclei has been studied extensively over the years [2]. In order to investigate the extent and persistence of the scissor resonance in other mass regions, an experiment was performed utilizing the NaI(Tl) gamma-ray detector array (CACTUS) and silicon particle telescopes (SiRi) at the cyclotron laboratory at the University of Oslo. Particle-γ coincidences from the ^{181}Ta(d,p)^{182}Ta reaction were used to measure the nuclear level density and photon strength function of the well-deformed ^{182}Ta system, to investigate the existence of resonances below the neutron separation energy. In this talk I will present and discuss the final results of this investigation and place our findings in the context of previous work.

[1] M. Guttormsen et al. Phys. Rev. Lett. 109, 162503 (2012).

[2] P. von-Neumann-Cosel, K. Heyde, and A. Richter, Rev. Mod. Phys., 82, 2365, (2010).

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