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## Searching for the low-energy enhancement in 91-Zr

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The nuclear level density (NLD) and  $\gamma$ -ray strength function ( $\gamma$ SF) are quantities that give essential information about the behaviour of a nucleus at high excitation energy. NLD is defined as the number of levels per unit of excitation energy.  $\gamma$ SF is defined as a measure of the average reduced  $\gamma$  decay probability of a nucleus. These concepts are useful at high excitation energies where the spacing between the levels is small and gives information on degrees of freedom and underlying nuclear dynamics. The evidence of the low-energy enhancement in the  $\gamma$ SF for energies less than 4 MeV has been discovered in several nuclei. Recently, a strong enhancement of M1 transitions in  $^{90}\text{Zr}$  has been predicted for  $\gamma$ -ray energies below 2 MeV in shell model calculations. In this work we explored the existence of the low-energy enhancement in the neighbouring  $^{91}\text{Zr}$  isotope with the assumption that neighbouring isotopes have similar  $\gamma$ SF and hence provided first experimental NLD and  $\gamma$ SF for this nucleus. The experiment  $^{90}\text{Zr}(d,p)^{91}\text{Zr}$  was conducted at the Oslo Cyclotron Laboratory (OCL). The SiRi (silicon telescope) array was used to detect charged ejectiles from the reaction. The CACTUS (NaI(Tl) detectors) array was utilized to detect  $\gamma$  rays that were in coincidence with charged particles. The nuclear level density and  $\gamma$ SF were extracted with the Oslo method. The existence of the LEE was observed, which agrees with the shell model calculations in  $^{90}\text{Zr}$ . The NLD and  $\gamma$ SF quantities were used to calculate  $(n,\gamma)$  cross sections with the Talys reaction codes. These were compared with experimental data from direct measurement to test the reliability of the approach used in this work.

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

Yes

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

MSc

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

no

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