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Gamma-Ray Strength Function in ⁷⁴Ge from the Ratio Method

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An increasing number of experiments reveal the presence of a low-energy enhancement in the gamma-ray strength function (GSF). The GSF, which is the ability of nuclei to absorb and emit &gamma rays, provides insight into the statistical properties of atomic nuclei. For this project the GSF was studied for ⁷⁴Ge which was populated in the reaction ⁷⁴Ge(p,p')⁷⁴Ge at a beam energy of 18MeV. The data were collected with the STARS-LIBERACE array at Lawrence Berkeley National Laboratory. Silicon detector telescopes were used for particle identification and &gamma -rays in coincidence were detected with 5 Clover-type high-purity germanium detectors. Through the analysis particle- &gamma - &gamma coincidence events were constructed. These events, together with well-known energy levels, were used to identify primary &gamma rays from the quasicontinuum. Primary &gamma-rays from a broad excitation energy region, which decay to two 0+ states, six 2+ states, two 3+ states, five 3- states, and four 4+ states, could be identified. These states and the associated primary &gamma -rays are used to measure the GSF for ⁷⁴Ge with the Ratio Method [1], which entails taking ratios of efficiency corrected primary &gamma-ray intensities from the quasicontinuum. I will discuss the results from the analysis of the data from the above reaction and focus on the existence of the low-energy enhancement in ⁷⁴Ge. The results are further discussed in the context of other work done in ⁷⁴Ge using the (&gamma,&gamma') [2], (³He,³He') [3] and (&alpha,&alpha') [4] reactions.

[1] M. Wiedeking et al., Physical Review Letters 108, 162503 (2012)
[2] R. Massarczyk et al., Physical Review C 92, 044309 (2015)
[3] T. Renstrøm et al., Physical Review C 93, 064302 (2016)
[4] D. Negi et al., Physical Review C 94, 024332 (2016)

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Level for award
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Main supervisor (name and email)
and his / her institution

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