Contribution ID: **18** Type: **Invited talk**

Nuclear structure of 76Ni from the (p,2p) reaction

Tuesday, 1 August 2023 11:25 (25 minutes)

The nuclear structure of the 76Ni nucleus was investigated by (p,2p) reaction using a NaI(Tl) array to detect the deexciting prompt γ rays. A new transition with an energy of 2227 keV was identified by γγ and γγγ coincidences. According to these coincidence spectra, the observed transition connects a new state at 4147 keV and the previously known 4+1 state at 1920 keV. Two weaker transitions were also obtained at 2441 and 2838 keV, which could be tentatively placed to feed the known 2+1 state at 990 keV. Our shell-model calculations using the Lenzi, Nowacki, Poves, and Sieja interaction produced good candidates for the experimental proton hole states in the observed energy region, and the theoretical cross sections showed good agreement with the experimental values. Although we could not assign all the experimental states to the theoretical ones unambiguously, the results are consistent with a reasonably large Z=28 shell gap for nickel isotopes in accordance with previous studies.

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Session Classification: Shell structure around 78Ni isotope