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Study of ^{40}Ar(p,p) resonance scattering using the AT-TPC and discussion of the single-particle limit JIE CHEN, DANIAL BAZIN, National Superconducting Cyclotron Laboratory, MSU — Isobaric resonances are important observations to investigate neutron single-particle states using the isospin symmetry of the nuclear force. These analog resonances are regularly observed in the excitation functions of proton elastic scattering. The resonance elastic scattering $^{40}\mathrm{Ar}(p,p)^{40}\mathrm{Ar}$ was carried out using the Active Target Time Projection Chamber (AT-TPC) in inverse kinematics, taking advantage of its capability to measure the scattered protons as the beam slows down in the gas. Pure hydrogen gas was used as the target as well as the tracking media. The preliminary result shows consistency compared to the previous $^{40}\mathrm{Ar}(p,p)^{40}\mathrm{Ar}$ measurements as well as the $^{40}\mathrm{Ar}(d,p)$ transfer reaction done in normal kinematics. The proton partial width is related to the S by its ratio to the single-particle width, which is usually estimated from the R-matrix formalism using the Breit-Wigner limit. A more realistic approach is to calculate the single-particle width of individual (l,j)-values within the Wood-Saxon potential. In yet another approach, S is deduced by using the bound neutron wave function in the isobaric analog nuclei. These different ways to determine the single-particle width and the spectroscopic factors are compared and discussed.

Jie Chen
National Superconducting Cyclotron Laboratory, MSU

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