Contribution ID: **53** Type: **Oral**

Nuclear structure studies of low-lying states in 194Os using fast-timing coincidence gamma-ray spectroscopy

The properties of excited states in the neutron-rich nucleus 194Os have been investigated using the 192Os(18O, 16O)194Os 2 neutron transfer reaction using a 80 MeV 18O heavy-ion beam provided by the tandem van de Graaff accelerator at the IFIN-HH laboratory Bucharest. Discrete ɣ-ray decays from excited states have been measured using the hybrid HPGe-LaBr3 (Ce) ɣ-ray spectroscopic array RoSPHERE. The timing and energy response of the RoSPHERE system have been evaluated using a number of point radioactive sources and through other nuclear reaction products formed from reactions on minor target contaminants as well as via unsafe Coulomb excitation on the 192Os target. The work identifies a number of previously unreported low lying non-yrast states in 194 Os as well as the first B(E2;2 + ⟶ 0 +) measurement for this nucleus. The experimental results are compared with FB/IBM calculations and are consistent with a reduction in a quadrupole collectivity in Os isotopes with increasing N.

Keywords: RoSPHERE, Coincidence, Gamma-ray array, Spectrometer, high-purity germanium, lanthanum tribromide scintillators, matrix elements and time difference.

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Session Classification: Nuclear Structure Studies

Track Classification: Nuclear Structure Studies