李政道研究所
TSUNG-DAO LEE INSTITUTE

# Nuclear Matter Symmetry Energy from Experiment, Theory and Observation

**Speaker:** Prof. James Lattimer, Stony Brook University

**Time:** Nov. 4th, 2022, 9am  **Host:** Sophia Han

**Location:** online

***Zoom meeting Link:***
https://cern.zoom.us/j/65919250561?pwd=RTZveU9wZU4zem

***Meeting ID: 659 1925 0561   Passcode: 123456***


**Abstract:**
Nuclear mass measurements and neutron matter theory tightly constrain the parameters SV and L of the nuclear symmetry energy. Corroboration can be found from measurements of the neutron skin thicknesses and dipole polarizabilities of neutron-rich nuclei, as well as astrophysical measurements of the neutron star radius. The recent PREX and CREX neutron skin measurements, while apparently predicting divergent results for L, jointly imply values commensurate with those from neutron matter calculations, recent NICER neutron star radius measurements, and GW170817 tidal deformability measurements.


**Biography:**
James Lattimer is a Distinguished Professor of Physics & Astronomy at Stony Brook University. He received his BS from the University of Notre Dame and PhD from the University of Texas at Austin. In his 1976 PhD thesis, he proposed that the bulk of r-process elements have their origin in decompressing neutron star matter ejected from mergers involving neutron stars, a prediction apparently validated by observations of the neutron star merger GW170817 and its kilonova. He led development of a liquid-droplet model for nuclei in dense matter and produced the first open-source analytic and tabulated equations of state for hydrodynamical simulations of supernovae and neutron star mergers. His detailed models of neutrino emission from proto-neutron stars correctly predicted the essential features of the neutrino emission fortuitously observed from SN 1987A only a few months later. He established the first clear link between neutron star radii and the nuclear symmetry energy. He helped develop minimal cooling paradigm for neutron star cooling, demonstrate that the Cas A neutron star's rapid cooling is likely due to the onset of neutron superfluidity in its core, and suggest that a warm dust 'blob' in the remnant of SN 1987A is probably hiding the long-sought neutron star born in that supernovae. He is a member of NASA's Neutron Star Interior Composition ExploreR (NICER) detector team. He is a Fellow of the APS and has received Alfred P. Sloan and John Simon Guggenheim Fellowships as well as the Hans A. Bethe Prize, which is the highest APS honor in nuclear astrophysics.