

UNIVERSITY OF NOTRE DAME  
DEPARTMENT OF PHYSICS

# SPECIAL NUCLEAR SEMINAR

Monday, August 8

## *Covariant density functional theory for nuclear structure and nuclear astrophysics*

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During the last decades, the covariant density functional theory with a minimal number of parameters, allows a very successful description of nuclear structure properties range from ground state to excited state all over the nuclear chart.

CDFT, implemented with self-consistency and taking into account various correlations by spontaneously broken symmetries, provides an excellent description for the ground-state properties. With pairing correlations and the continuum effect properly taken into account, the self-consistent microscopic descriptions and predictions of the neutron halo phenomena in both spherical and deformed nuclei become possible. Constrained and cranking calculations, CDFT in a static external field, are powerful tools to investigate the shape evolution, shape isomers, shape-coexistence, fission landscapes, and rotational spectra in both near spherical and deformed nuclei. RPA calculation based on CDFT provides a successful description of the mean energies of nuclear giant resonances. The restoration of symmetries and configuration mixing to take into account fluctuations around the mean-field equilibrium based on CDFT as well as its simplification, collective Hamiltonian, describe well the nuclear low-lying states and shape transitions well. Future perspective on CDFT application for nuclear astrophysics and its future development will be discussed.

**4 pm – 5 pm**  
**Nuclear Science  
Laboratory**  
**124 Nieuwland  
Science Hall**

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All interested  
persons are  
cordially invited  
to attend