Ina Sarcevic

Brief summary of past research experience

Prof. Sarcevic's research in the last 30 years has been focused on a broad range of topics in particle physics and astrophysics ranging from ultrahigh energy neutrinos, heavy quark production in hadronic collisions, minijets and direct photon production in hadronic collisions, photoproduction cross sections at HERA and Fermilab energies, microscopic black hole production at the LHC and in interactions of ultrahigh energy extragalactic neutrinos, neutrino oscillations in theories of large extra dimensions, supersymmetry searches with neutrino telescopes to astrophysical neutrinos and indirect dark matter searches. Sarcevic had supported and mentored 18 postdoctoral fellows and 10 graduate students, many of whom have been involved in research projects mentioned above. Professor Sarcevic's research group currently consists of postdoctoral fellow, Dr. Yu Seon Jeong and graduate student Pedro Luis Espino. Research projects performed recently include studies of heavy dark matter decay as a source of ultra-high energy neutrinos recently observed by IceCube collaboration, charm decays of slow-jet supernovae as astrophysical sources of the observed neutrinos, the prompt atmospheric neutrino flux and the studies of self-interactions of dark matter with emphasis on exploring the nature of dark matter from observations of astrophysical objects, such as old neutron stars.

Past research experience, of relevance to DUNE physics, is extensive studies of neutrino interactions in the Standard Model and in the Beyond the Standard Models. In the former case, neutrino interactions has been evaluated using the latest state of the art QCD approach, and followed by the propagation of the leptons produced in neutrino interactions with the matter. Energy loss of leptons combined with their lifetime (for taus), has been evaluated for large range of energies. In the latter case (BSM), Sarcevic has considered neutrino oscillations in the theory with Large Extra Dimensions; production and detection with neutrinos of the SUSY particles, such as staus, and Supernova Neutrino (SN) interactions with the cosmic neutrino background via new gauge bosons present in the BSM with the additional gauge symmetry responsible for the neutrino mass. Dark matter studies were done for variety of dark mater models (SUSY candidates, Kaluza-Klein particles, leptophilic models, etc) finding their unique signals with neutrinos. In addition, Sarcevic has considered old neutron stars to study how their detection provides information about dark matter self-interaction of the asymmetric bosonic dark matter.