Contribution ID: **8** Type: **not specified**

Nucleons, Electrons, and Pasta: Discovering Dark Matter by Reheating the Neutron Star Soup

Tuesday, 24 March 2020 11:10 (40 minutes)

I present a largely model-independent probe of dark matter interactions with nucleons and electrons. Accelerated by gravity to relativistic speeds, local dark matter scattering against old neutron stars deposits kinetic energy at a rate that heats them to infrared blackbody temperatures. The resulting radiation is detectable by next generation telescopes such as James Webb, the Thirty Meter Telescope, and the European Extremely Large Telescope. I treat neutron star capture of dark matter by scattering (a) in the various layers of the well-understood stellar crust, on nucleonic and nuclear constituents, which include non-spherical "pasta" phases, (b) in the less understood stellar core, on nucleons and muons using non-relativistic kinematics, and on electrons using relativistic kinematics. I show that the (non-)observation of dark kinetic heating of neutron stars would overcome several limitations of terrestrial searches for dark matter, and advance challenging frontiers by orders of magnitude.

Presenter: RAJ, Nirmal (TRIUMF)

Session Classification: Invited talks