Argonne NATIONAL LABORATORY

PHY Seminar

Physics Division Seminar

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Origins of the Astrophysical *r*-process

Host: Melina Avila

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The site of *r*-process nucleosynthesis, which forges some of the heaviest elements in the periodic table, has been a long-standing mystery in astrophysics. Electromagnetic follow-up observations of the gravitational wave-detected binary neutron star merger GW170817 suggested that material ejected during the merger underwent a robust *r*-process, burning elements such as Au, Pt, and Eu. However, uncertainties in the interpretation of the electromagnetic signal, as well as doubts about mergers' ability to synthesize *r*-process elements in all the environments in which they are observed, raise the question of whether mergers are unique sites of *r*-process production. I will discuss ongoing work into the uncertainties surrounding the interpretation of the electromagnetic signatures from neutron star mergers, consider the possibility that rare core-collapse supernovae might be important alternative sources of *r*-process material, and outline how a combination of modeling and observation can help resolve the mysteries of astrophysical nucleosynthesis.