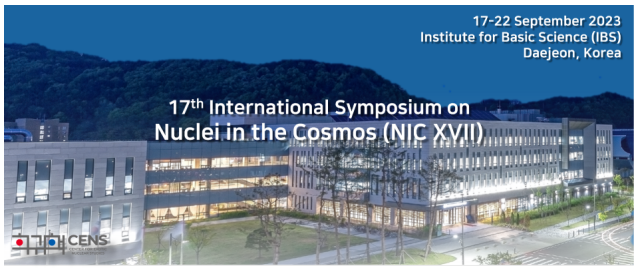

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Kilonova Modelling: Nuclear Physics, Magnetic Fields, Neutrinos

Tuesday, 19 September 2023 17:55 (5 minutes)

The merging of two neutron stars can provide the conditions necessary for the production of the heaviest elements in the universe via the rapid neutron capture process (r-process). When this occurs, an abundance of material is produced lying far from nuclear stability, and the decays of these nuclei produce the electromagnetic signal: the kilonova. Modeling these kilonova signals remains subject to uncertainties stemming from both nuclear properties far from stability as well as from incomplete information regarding the evolution of the extreme astrophysical environment in which this occurs.

I will discuss current work aimed at approaching this problem from both an astrophysical perspective with magnetohydrodynamic simulations of the post-merger disk with neutrino transport, as well as from a nuclear perspective with detailed nucleosynthesis studies. I will highlight recent results in identifying key nuclei for the nuclear heating that powers the kilonova as well as the effect of nuclear uncertainties on cosmochronometry calculations for r-process enhanced metal-poor stars.

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