



Contribution ID: 21

Type: **not specified**

Dark Photons can Prevent Core-Collapse Supernova Explosions

Thursday 20 February 2025 15:00 (30 minutes)

During the accretion phase of a core-collapse supernova (SN), dark-photon (DP) cooling can be largest in the gain layer below the stalled shock wave. In this way, it could counter-act the usual shock rejuvenation by neutrino energy deposition and thus prevent the explosion. This peculiar energy-loss profile derives from the resonant nature of DP production. The largest cooling and thus strongest constraints obtain for DP masses of 0.1–0.4 MeV, a range corresponding to the photon plasma mass in the gain region. Electron-capture SNe, once observationally unambiguously identified, could provide strong bounds even down to nearly 0.01 MeV. For a coupling strength so small that neutrino-driven explosions are expected to survive, the DP cooling of the core is too small to modify the neutrino signal, i.e., our new argument supersedes the traditional SN1987A cooling bound.

Presenter: Dr YUN, Seokhoon (IBS-CTPU)

Session Classification: DM