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Supernova neutrinos and neutrino decay

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Neutrinos, electrically-neutral particles interacting exclusively through the weak force, were initially considered massless in the Standard Model. However, the discovery of neutrino oscillations in vacuum and matter by Super-Kamiokande (1998) and the Sudbury Neutrino Observatory (2002), respectively, established that neutrinos are massive. Thus, neutrinos became the first evidence of physics beyond the Standard Model.

Although elusive, neutrinos are everywhere and they are produced from different sources. In particular, neutrinos are produced in large quantities in supernovae. However, to this date, the observation of supernovae through neutrino detection has been limited to a single event, SN1987A. Another possibility for studying supernova neutrinos is through the detection of the Diffuse Supernova Neutrino Background (DSNB) which represents the collective flux of neutrinos emitted by all past supernovae in the universe.

The detection of supernova neutrinos and in particular of the DSNB can provide information about the supernova explosion dynamics and neutrino properties. In this poster, I will present the main findings of my work, which focuses on investigating neutrino decay using supernova neutrinos.

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