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Effect of axion inclusion in CCSNe simulations

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Core-Collapse Supernovae (CCSNe) are important objects in the scope of global nucleosynthesis, neutrino and gravitational waves emissions, and even cosmology. However, the early stages of these processes are not observable through the classical electromagnetic radiations observations. This is why we rely on simulations to explore the possible mechanisms leading to the final explosion. One of the classical mechanism is the so called neutrino-driven supernovae, where neutrinos emitted from the cooling proto-neutron star will interact with the shock and give it sufficient energy to proceed to the final explosion. While axions are rarely considered in simulations due to their weak interactions with the matter, recent studies have highlighted their impact on the proto-neutron star cooling, as an energy sink term, and therefore on the neutrino emission and shock revival. In this talk, we will present new results showing the impact of axions inclusion in dynamical CCSN simulations.

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