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Neutrino flavour conversions near the supernova core

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Supernova neutrinos can experience "fast"self-induced flavor conversions almost immediately above the core, with important implications for the explosion mechanism and nucleosynthesis. Very recently, a novel method has been proposed to investigate these phenomena, in terms of the dispersion relation for the complex frequency and wave number (ω, k) of disturbances in the mean field of the ve-vx flavour coherence. I discuss a systematic approach to such instabilities, originally developed in the context of plasma physics. Instabilities are typically seen to emerge for complex ω, and can be further characterized as convective (moving away faster than they spread) and absolute (growing locally), depending on k-dependent features. The analytical classification of both unstable and stable modes leads not only to qualitative insights about their features but also to quantitative predictions about the growth rates of instabilities.

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