

# Supernova neutrino oscillations as a probe of leptonic CP-violation

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We investigate effects of nonzero Dirac and Majorana CP-violating phases on neutrino-antineutrino oscillations in a magnetic field of astrophysical environments. It is shown that in the presence of strong magnetic fields and dense matter, nonzero CP phases can induce new resonances in the oscillations channels  $\nu_e \leftrightarrow \bar{\nu}_e$ ,  $\nu_e \leftrightarrow \bar{\nu}_\mu$  and  $\nu_e \leftrightarrow \bar{\nu}_\tau$ . The resonances can potentially lead to significant phenomena in neutrino oscillations accessible for observation in future neutrino telescopes, such as JUNO, Hyper-Kamiokande and DUNE. In particular, we show that neutrino-antineutrino oscillations combined with Majorana-type  $CP$  violation can affect the  $\bar{\nu}_e/\nu_e$  ratio for neutrinos coming from the supernovae explosion.

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