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Collective neutrino oscillations in electron-capture supernovae

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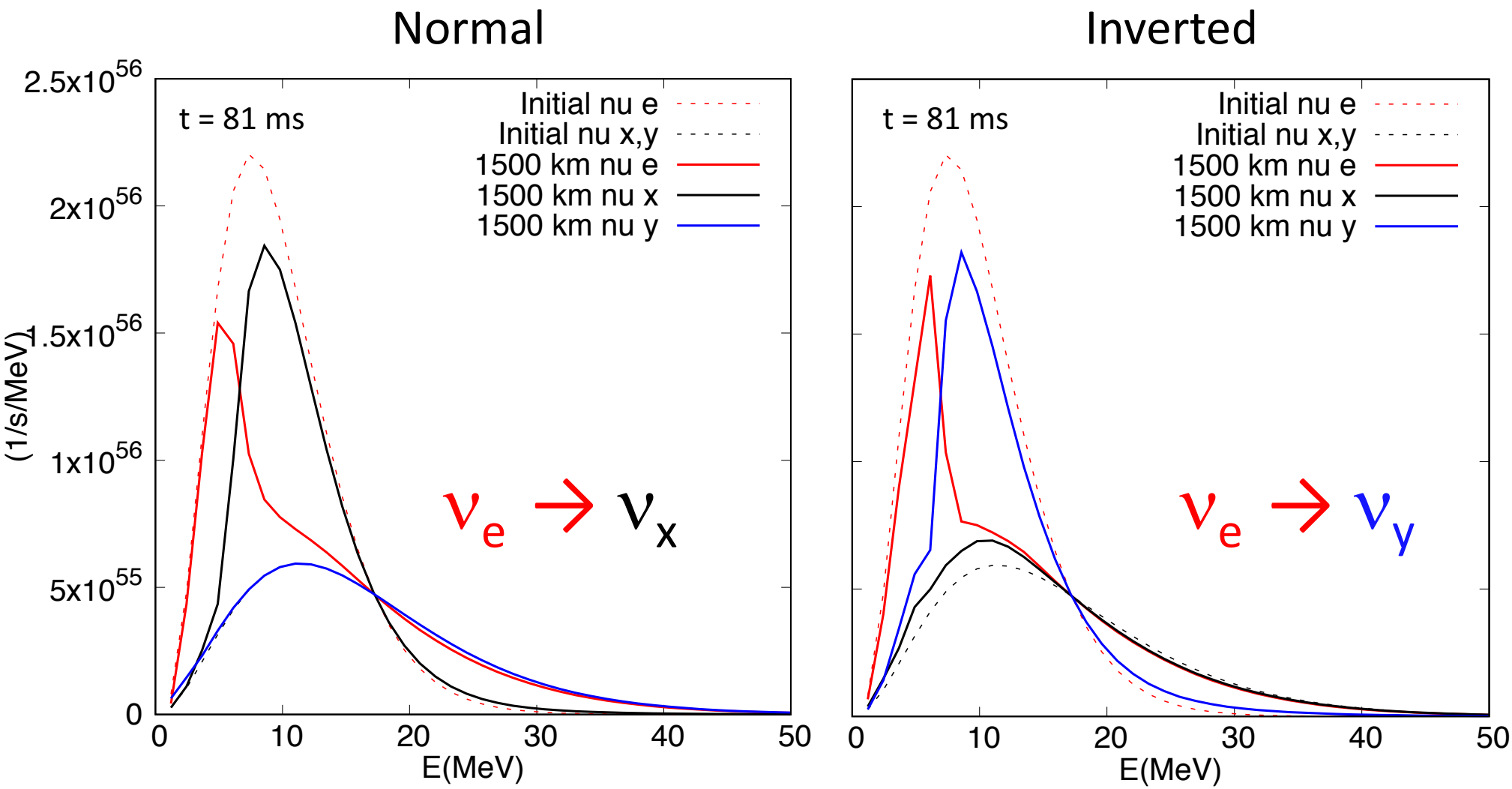
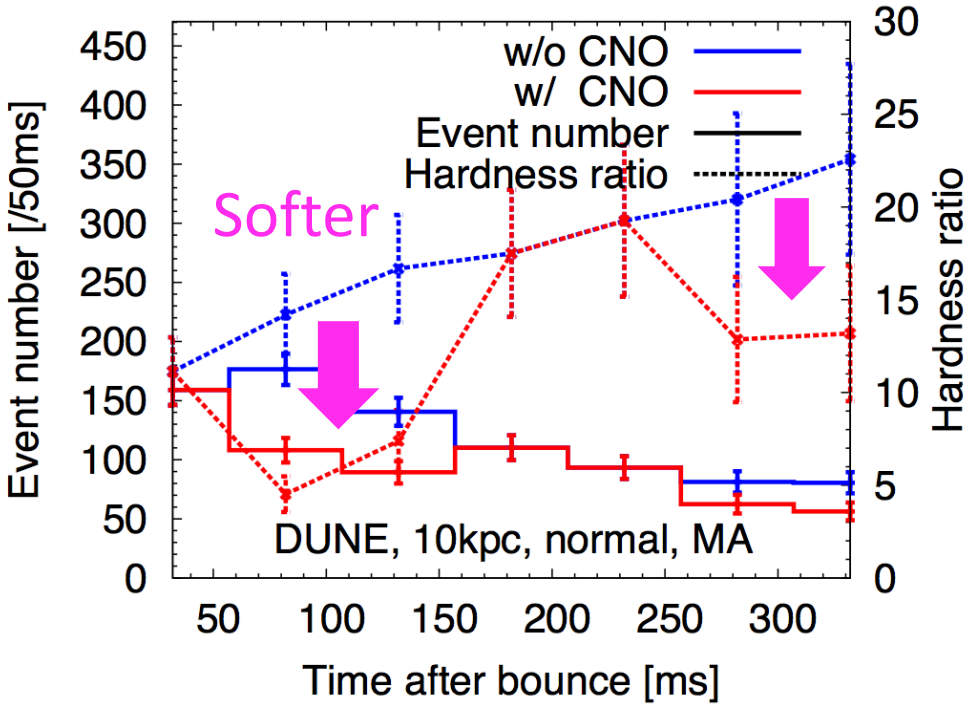
Collective neutrino oscillations change ν spectra



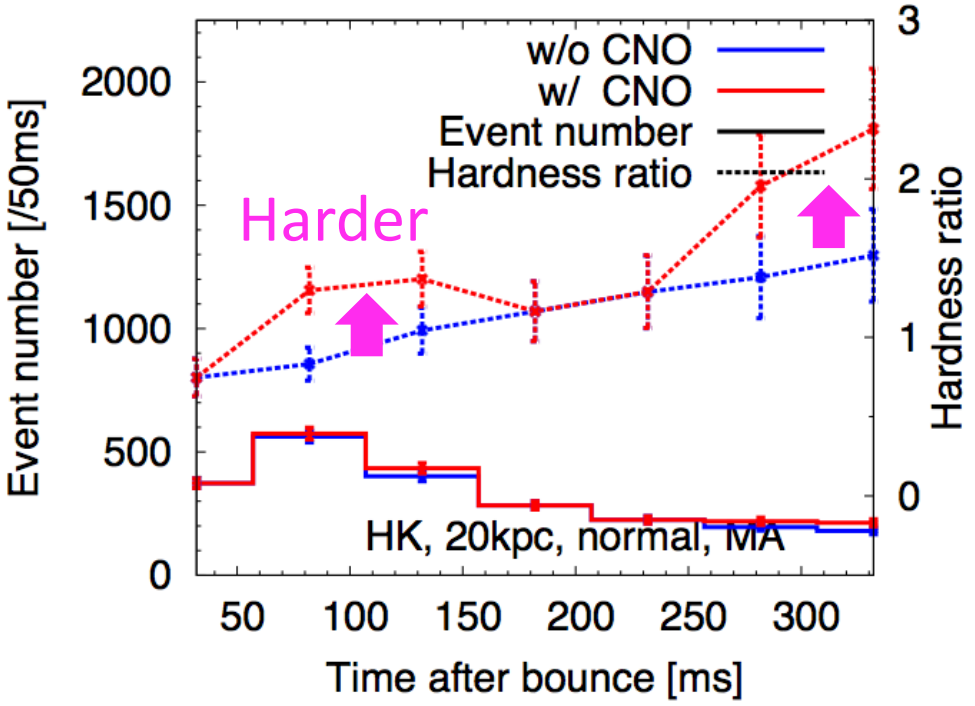
In 8.8 M_{sun} progenitor model, collective neutrino oscillations are well confirmed because of extraordinary dilute envelop

Detectability of collective neutrino oscillations

ν_e event @DUNE



$\bar{\nu}_e$ event @Hyper-Kamiokande (HK)



Hardness ratio

$$R_{\mathrm{H/L}} = \frac{\text{Event number (E>20 MeV)}}{\text{Event number (E<20 MeV)}}$$

Opposite behavior of $R_{H/L}$ in DUNE and HK

Softer $R_{H/L}$ is favorable for the detection of collective neutrino oscillations