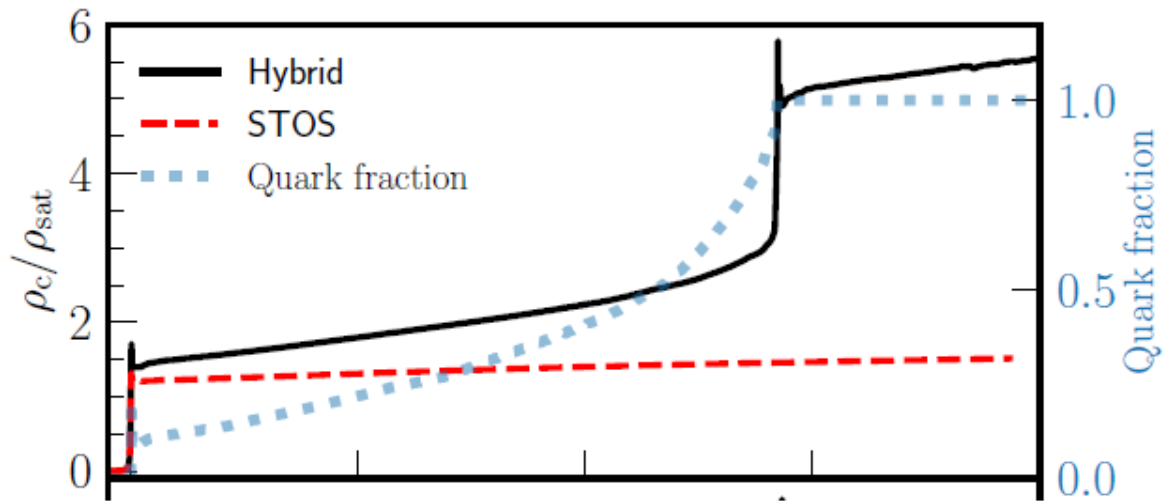
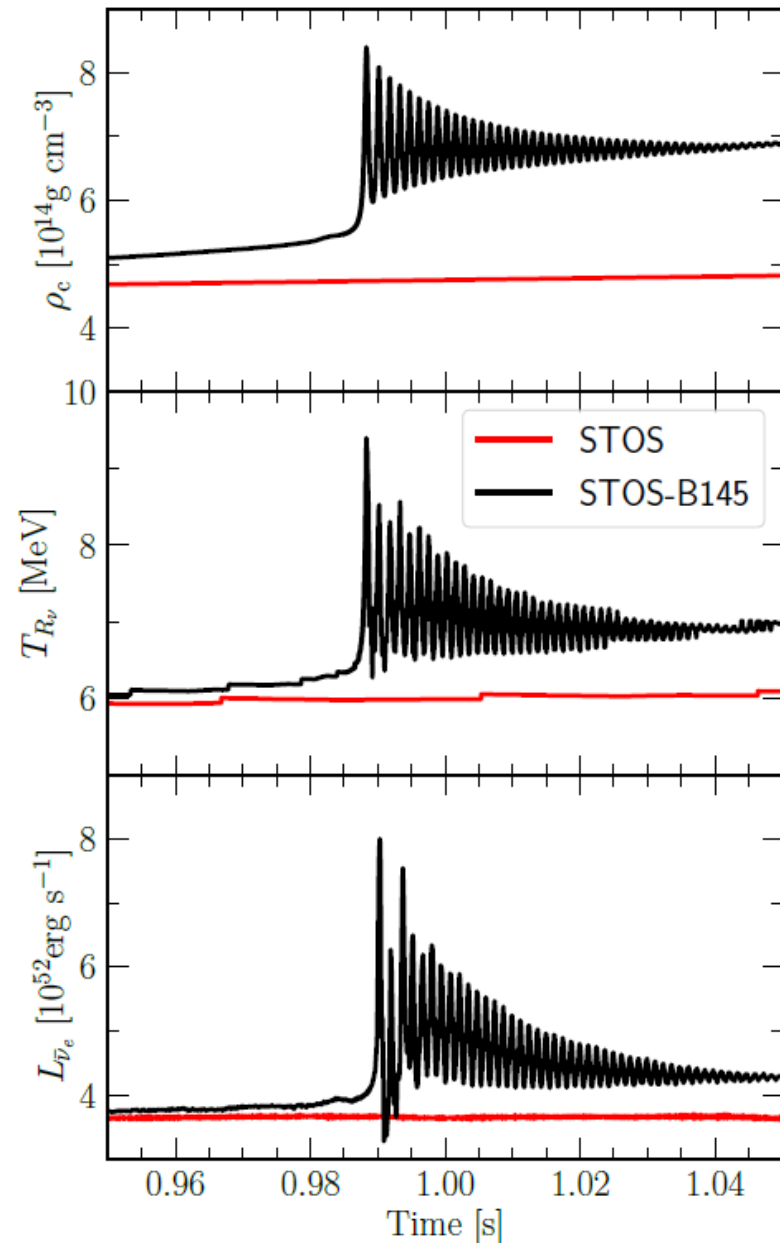


EoS with hadron-Quark PT leads to 2nd collapse

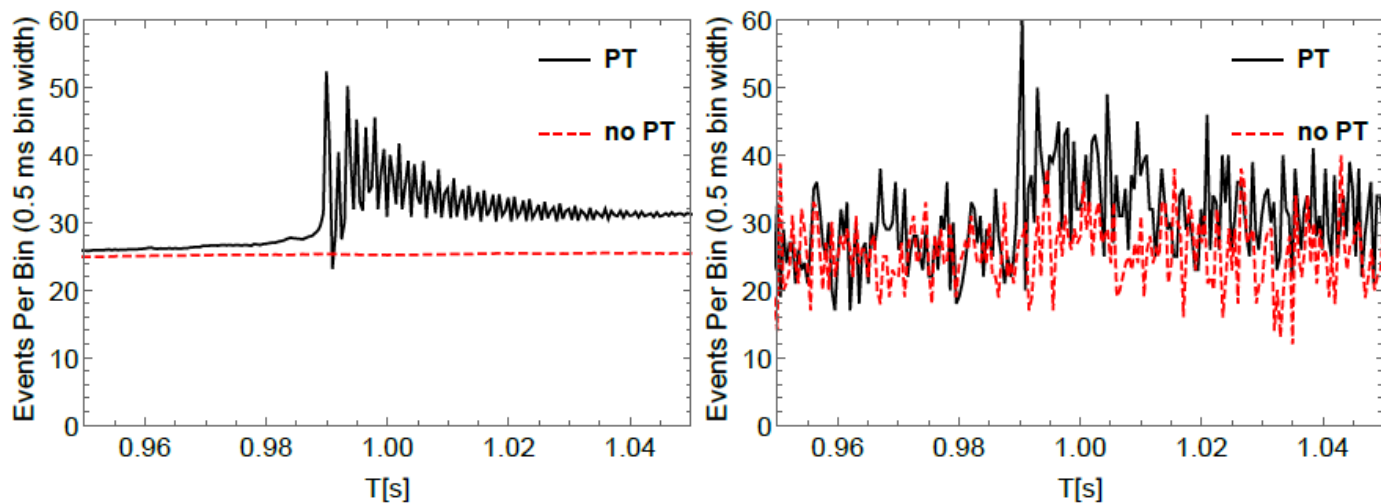


Progenitor Models with: $0.24 \lesssim \xi_{2.2} \lesssim 0.38$



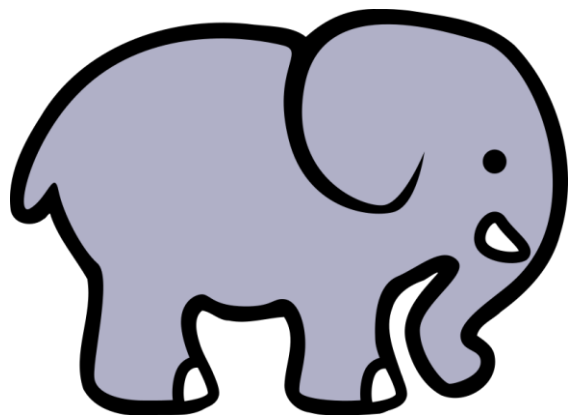
S. Zha, E. P. O'Connor, M. Chu, L. Lin, and S. M. Couch [arXiv: 2007.04716v2]

Realistic Neutrino Signals on HyperK (+Shot Noise)



Z. Lin, S. Zha, E. P. O'Connor, A. W. Steiner [arXiv:2203.05141v1]

Measure the Strength of Oscillations in Neutrino Signals



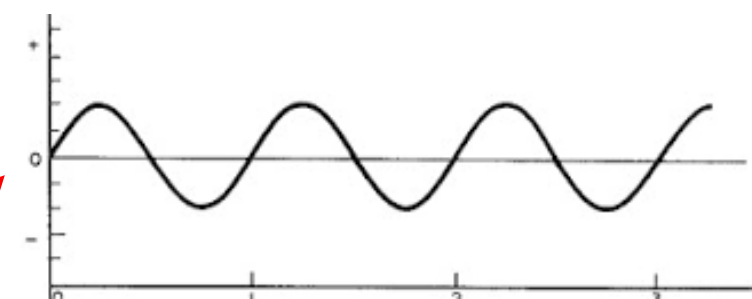
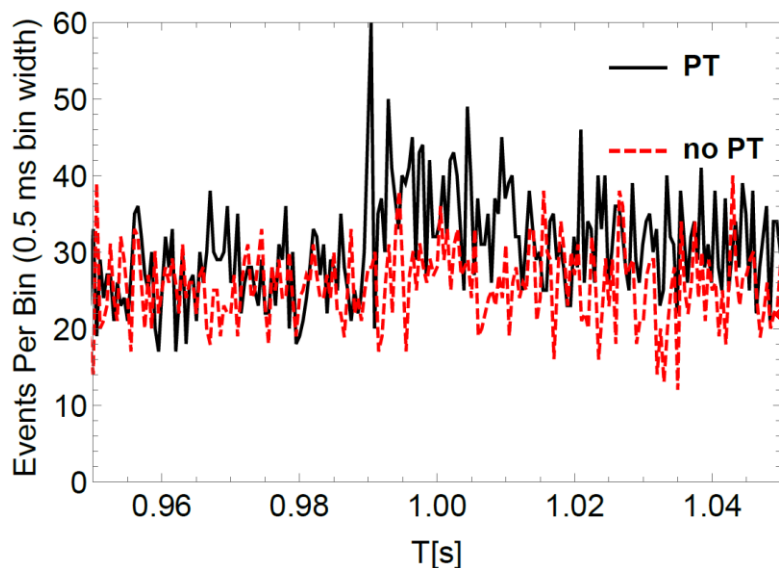
Directly compare the height of an elephant and a giraffe is difficult!



Use a ruler to measure the height of the elephant and the giraffe separately!



arXiv:2203.05141v1



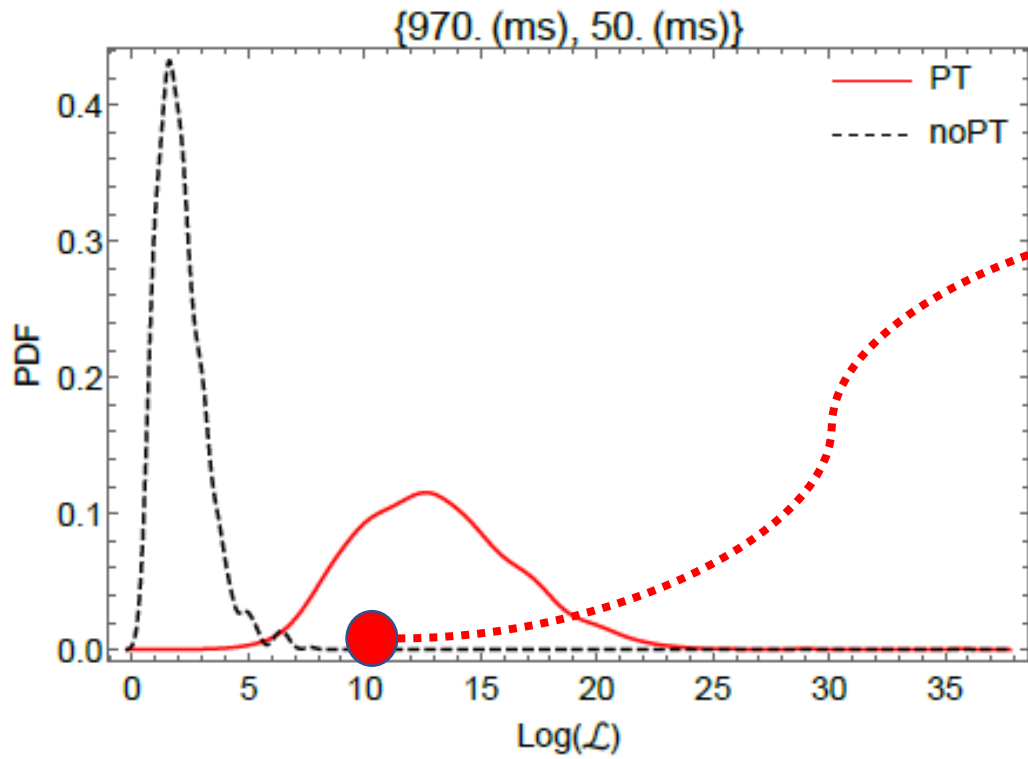
$$N_{PT}(t) = (A - n)(1 + a \sin(2\pi f_{PT}t)) + n$$

Use a Parameterized sinusoidal curve to “measure” the strength of the oscillation in neutrino signals from different models separately!

PT-Meter

$$\mathcal{L}(\{P\}) = \frac{\tilde{L}(\{P\}, \tilde{\Omega}_{PT})}{\tilde{L}(\{P\}, \tilde{\Omega}_{noPT})}$$

“Measure”: It means to calculate the above likelihood ratio in frequency domain for neutrino signals from various models.



Given \mathcal{L} from future observations, we can estimate the possibility that PT-induced oscillation residing in observed neutrino signals **quantitatively** (with **false alarm rate** and **probability of identification**)!

Duration & Frequency
Of damped PT-induced Oscillations

$$\tau_{\text{damp}} = \frac{2\bar{\rho}c_S^2}{\omega^2\xi}$$

Effective Bulk Viscosity
Inferred from ν signals

$$\xi_{\text{eff}} \lesssim 2.5 \times 10^{29} \text{ g}/(\text{cm s})$$