Model-independent reconstruction of full flavor supernova neutrino spectra in future large liquid-scintillator detectors

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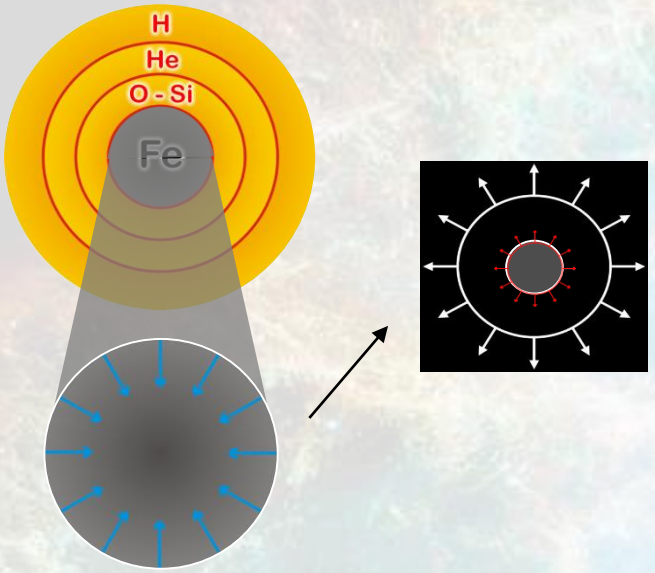
SN neutrino events in LS



All flavor supernova burst neutrinos emitted from a CCSN

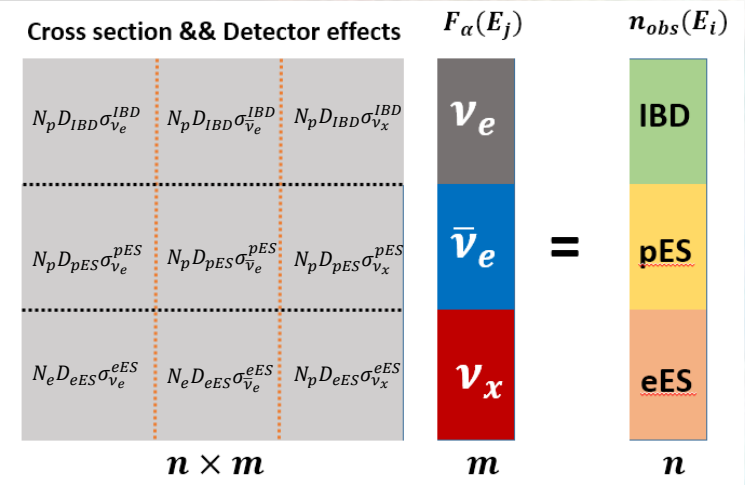
Channel	
This work	$\bar{\nu}_e + p \rightarrow e^+ + n$
	$\nu + p \rightarrow \nu + p$
	$\nu + e \rightarrow \nu + e$
	$\nu + {}^{12}\mathrm{C} \rightarrow \nu + {}^{12}\mathrm{C}^*$
	$\nu_e + {}^{12}\mathrm{C} \rightarrow e^- + {}^{12}\mathrm{N}$
	$\bar{\nu}_e + {}^{12}\mathrm{C} \rightarrow e^+ + {}^{12}\mathrm{B}$

In liquid scintillator detectors, all flavor information is mixed in multiple channels

Goal: reconstruct energy spectra for all flavor SN neutrino emitted from the core of a SN

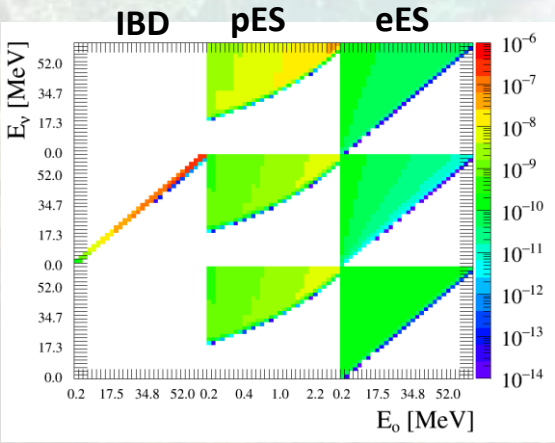
The combined method

Detected spectra → **Energy spectra for different flavor SN neutrinos**



This method:

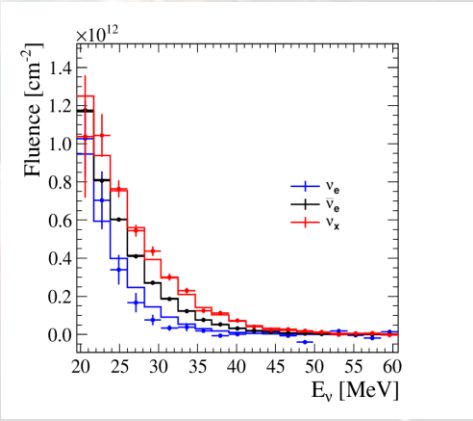
- All flavor neutrino spectra reconstructed
- SN neutrino model independent
- Potential to deal with SN neutrinos with flavor conversion



Response matrix

SVD Unfolding

JUNO-like LS detector



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Please find more in our POSTER

- Observed energy threshold effect
- Spectra Reconstruction for SN neutrinos with flavor conversion
- …