

Invitation to Discussion

Supernova Neutrinos (and surroundings)

Disclaimer: non exhaustive, intended only to stimulate discussion!

Topics

- 'Theoretical' problems
- Input from Simulations
- Input for Simulations
- Links with Phenomenology/Experiments

Open Theoretical Issues

(non exhaustive)

- Do we understand the 3 flavour dynamics?

E.g. subtle effects like multi-angle effects, role of matter-induced decoherence, CP violation, new flavour physics...

- Are many body effects relevant?

(higher-order correlation functions/beyond mean field)

- Can we deal properly with “reduced symmetries”?

(e.g. turbulence, anisotropic profiles, realistic ν -emission region)

- Other inadequacies intrinsic to the formalism?

- # modes necessary for convergence:

physical arguments to justify why low-# numerical experiments lead to unphysical results?

Input from simulations

- New results from simulations: toward an agreement on generic v fluxes properties (at least Ne-O-Mg &/or early times)?
- Should we push for some outputs to be made public available? (at least to people “registered” to a SN v list)?
- Agreeing on “benchmark” inputs for phenom. studies?
E.g. for different classes of progenitors (& from different groups), so that different studies are performed under the same input flux assumptions...
- Moving beyond time-integrated spectra?
(we know that many physical effects can be time-dependent!)

Input for simulations

- Can we lobby for some preliminary study of the qualitative effects being revealed in a simulation?
- “Benchmark” cases from SNe community for simulators?
- What the consequences for SN nucleosynthesis?
(r or ν -process)
- Applications to other objects (short/long GRBs?)

Links to phenomenology/exp.

- What are the desiderata of future detector(s) from the point of view of SN ν physics? Examples:
- +/-'s single/many technologies @ one/many locations
(Redundancy to reduce systematics? Some flavour dependence? Earth effect? Time-dep. Observables?)
- Can we conceive tests in different cases to prove that a future signal does not contain equal fluxes of ν_e and/or ν_x &/or $\text{anti}\nu_e$ (i.e. that flavour dynamics is essential)?
- What are the crucial nuclear uncertainties in the data-deconvolution (e.g. ν -Nuclei cross sections)?
Should we lobby for/engage in enterprises to solve them theoretically or experimentally?