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P3.091 **Symmetry breaking for collective neutrino oscillations in supernovae**

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Collective neutrino oscillations have been known for several years to have a potentially large impact on neutrino flavour conversion in supernovae. Originally, all calculations were done assuming that the approximate spherical symmetry of the proto-neutron star at the core of the supernova would impose itself on the flux of neutrino flavours.

However, under some circumstances, this is questionable in a number of ways. The first question relates to flavour dependence on the neutrino emission angles, where breaking of the symmetry has proven to facilitate flavour conversion, while a second question concerns the role of spatial inhomogeneity. We have shown that the combined effect of background matter and the multi-angle nature of the emitted neutrinos suppress the importance of inhomogeneities relative to the spherically homogeneous mode. Apart from the issue of spatial inhomogeneity, the question of temporal variance has also come up, and we have straight-forwardly extended our calculation to include this.

Finally, we demonstrate that some asymmetrically prepared systems show flavour conversion at a much faster time scale than what is usually found for more symmetric cases. The consequence of such rapid conversion is that certain critical conditions in a very small part of the supernova envelope can give rise to neutrino flavour conversion. This will significantly effect the neutrino spectrum, nucleosynthesis and possibly even the supernova explosion itself. Even so, the take-away message is that caution must be exercised when trying to calculate the effects of collective oscillations - both when predicting large flavour conversions and when predicting none.