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Non-linear flows for the neutrino masses

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Recently, I developed a non-linear multi-flow perturbation theory for massive neutrinos and other free-streaming particles, called Flows For The Masses. It bins their initial Fermi-Dirac distribution into discrete momenta, with neutrinos of each initial momentum treated as a separate fluid obeying the continuity and Euler equations of motion. I describe its non-linear corrections, based upon a generalization of the Time-Renormalization Group perturbation theory, and their acceleration by over two orders of magnitude using Fast Fourier Transform techniques. Then, I discuss ongoing work to emulate the massive neutrino power spectrum in cosmologies with rapidly-varying dark energy, and I propose further applications to N-body simulations.

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