

## Neutrino Mass Measurement with Cosmic Gravitational Focusing

We thoroughly explore the cosmic gravitational focusing of cosmic neutrino fluid (CvF) by dark matter (DM) halo using both general relativity for a point source of gravitational potential and Boltzmann equations for continuous overdensities. Derived in the most general way for both relativistic and non-relativistic neutrinos, our results show that the effect has fourth power dependence on the neutrino mass and temperature. With nonlinear mass dependence which is different from the cosmic microwave background (CMB) and large scale structure (LSS) observations, the cosmic gravitational focusing can provide an independent cosmological way of measuring the neutrino mass and ordering. We take DESI as an example to illustrate that the projected sensitivity as well as its synergy with existing terrestrial neutrino oscillation experiments and other cosmological observations can significantly improve the neutrino mass measurement.

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