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Massive neutrinos and their effect on the large scale structure of the Universe

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Neutrinos are described as fundamental particles by the standard model of particle physics. The fact that neutrinos are massive, as demonstrated by neutrino oscillations experiments, point towards physics beyond the standard model. Thus, one of the most important questions in modern physics is: which are the masses of the neutrinos? Current tightest constrain on the sum of the neutrino masses arise from cosmology observables. In order to extract the maximum information from current and future surveys, as well as to avoid introducing biases in the values of the cosmological parameters, it is of primordial importance to understand, both at the linear and at the fully non-linear order, the impact that massive neutrinos induce on the distribution of matter, halos and galaxies. Among the different methods that can be used to carried out this task, N-body simulations offer the most accurate picture. In this talk I will show how to run N-body simulations in cosmologies with massive neutrinos. I will also present some of the effects neutrinos induce on the Universe large scale structure, among then the clustering of matter, the clustering of dark matter halos, the abundance of halos, the abundance of voids, their impact on the BAO peak and so on.

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