Institute of Space Sciences

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Robust galaxy clustering with Euclid: the challenge of the ELG-halo connection

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Euclid will map the Universe with 3D positions of 30 million H-alpha Emission Line Galaxies to make unprecedented constrains in cosmology. The exquisite dataset will reduce extremely the statistical uncertainties, requiring a deeper look at different sources of systematic errors. One of them will come from the uncertainty of how ELGs relate to halos and its possible effect on galaxy clustering. Hence, a deeper understanding of this ELG-halo relation is needed. At the same time, Euclid must ensure that our constraints are robust to plausible variations of the ELG-halo connection.

In this talk, I will first review some of the lessons learned by studying the ELG-halo relation with eBOSS data (2007.09012). I will then present our recent findings (2312.13199) with a simulated Euclid-like ELG sample from a semi-analytical model of galaxy formation, SAGE. I will show that two proposed extensions of the classical HOD are required to recover the reference galaxy clustering. First, that ELG satellite occupation depends on whether or not the central galaxy is an ELG, a phenomenon known as conformity. Second, traditional profiles (Einasto, NFW) fail to reproduce the reference galaxy clustering, even when tuning their "free" parameters such as the concentration. We then propose an extension of the NFW curve that matches the observed ELG profile well and reproduces the reference galaxy clustering.

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