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## The halo model with beyond-linear halo bias: unbiasing cosmological con- straints from galaxygalaxy lensing and clustering

The halo model is a phenomenological model often used to interpret the large-scale structure of the Universe. In this model all dark matter exists within dark matter halos, which trace the underlying matter fluctuations. In its most generic form it includes a number of approx- imations such as dark matter halos are spherical and can be completely described by their mass, and that the halos trace the underlying matter fluctuations in a linearly biased way –linear halo bias. These assumptions have provided a useful description of large-scale structure observables until now, but with ever improving datasets need to be revisited. In this talk I will present the error introduced in a joint halo model analysis of galaxy-galaxy lensing and galaxy clustering observables when adopting the standard approximation of linear halo bias. I will discuss how we include beyond-linear halo bias, compare to an alternative approach, and show that the di- rection of the sizable offsets depends on the freedom afforded to the halo model through other nuisance parameters. Finally, I will conclude that beyond-linear halo bias must be included in future cosmological halo model analyses of large-scale structure observables on non-linear scales.

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