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# Fully non-linear statistical analysis of Large scale structure data for wide and deep surveys

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The current and future galaxy surveys give us several challenge both in terms of data management and interpretation. The interpretation is made particularly complex by observational limitations, such as selection and foreground issues, and the extreme dynamical non-linearity of the galaxies. Such problems are generally taken into account a posteriori in the analysis, and are covered by putting some weights on the galaxies calibrated using large number mock galaxy catalogs, designed to resemble as close as possible to the observations. Then the considered summary statistics, such as the power-spectrum, have to be closely examined and corrected for non-linearities.

We will showcase here our two frameworks, ARES (Algorithm for REconstruction and Sampling) and BORG (Bayesian Origin Reconstruction from Galaxies), to analyze deep and wide galaxy surveys, to reconstruct the initial conditions of our Local Universe and to deliver cosmological measurements. These statistical and computational frameworks are designed at their base for performance and statistical accuracy. The a posteriori measurements include already all the adequate uncertainties and corrections. I will discuss here the results of the tests that we conducted on present data-sets like 2M++ (Lavaux & Hudson 2011) and the Sloan Digital Sky Survey (SDSS3/BOSS, Dawson et al. 2013). I will move then to the current limitations of these frameworks and the future directions we intend to take.

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