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Science Group of MSE:	High redshift galaxies and cosmology
Research proposal:	Optimal tests on gravity or cosmological quantities on large scales

Motivation : Based on the main features of MSE, such as the large survey volume, the high density of the sample and the high bias of the quasars, MSE will open the unprecedented studies on cosmic acceleration by the galaxy clustering on very large scales, where the signals are nonetheless dominated by cosmic variance. The goal is how to extract optimal information from MSE by beating down cosmic variance on those large scales.

Proposals : One way to reduce cosmic variance is to use multi tracers with different biases of underlying matter distributions [U. Seljak et al, arXiv:0807.1770]. This technique can be used to probe some large-scale effects with the improved accuracy, like:

- On large scales, a full general relativistic (GR) description is required. Investigate the signal of GR correction on these large scales in galaxy clustering from MSE.
- Primordial non-Gaussianity of density perturations induces the scale-denpendent bias and the effect becomes significant on very large scales. Investigate the detectability of the non-Gaussianity.
- Improve the measurements of BAO and RSD from the large-scale power spectrum. So that the constraints on cosmological parameters from background evolution and structure growth can improve.

To do : (1) Perform forecasts to the signals of these effects using multi-tracer technique with the targeting galaxy and quasar from MSE. (2) Develop an optimal way to split the sample into multi tracers to extract the maximum observable signals. (3) Extend the multi-tracer method to the application of the real data.