

Laboratoire de Physique de Clermont (LPCA) – Cosmology Team

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Title of internship subject

Preparing for the kinematic dipole measurement with LSST

Summary :

The kinematic dipole tension results from the inconsistency between the CMB dipole as measured on Cosmological Microwave Background (CMB) data and the kinematic dipole inferred from quasar and radio galaxy count maps. The CMB dipole is usually interpreted as coming from the Earth movement with respect to the CMB rest frame. If the cosmological principle holds, the same dipole should be visible in the source distribution of far away objects, like quasars. This effect, known as the Ellis&Baldwin test, results from the fact that the observed source count is modified in the direction of the Earth motion, by doppler and aberration effects. While studies based on catalogues of quasars and radio galaxies seem to point to a 5 sigma discrepancy with the CMB dipole, the complexity of the possible biases and systematic uncertainties require that completely new datasets be used to hunt for the kinematic dipole signal. The Legacy Survey of Space and Time (LSST) by the Vera C. Rubin Observatory promises to be a remarkable dataset to attempt this measurement.

The goal of the internship is to work on an existing simulation framework to improve its degree of veracity by implementing several biases and putting in place the analysis chain of the resulting count maps. This is needed to make forecasts about LSST sensitivity and to plan for the adequate selection and analysis of its catalogue of galaxies.