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Cosmology with peculiar velocities

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The large scale structures (LSS) of our Universe result from the competition between expansion and gravitational interaction of matter. Hence, measuring the growth of LSS, through their peculiar velocities, is a key to probe both the expansion and gravity and precisely determine the nature of dark energy and validate General Relativity.

Peculiar velocity measurements rely on precise extragalactic distances estimation. Since peculiar velocities of galaxies are deviations from the Hubble expansion law, they have poor signal to noise ratio and are particularly sensible to usual systematic uncertainties such as calibration issues. Hence, the future of peculiar velocity analyses lies in Type Ia Supernovae observations from ZTF and, then, LSST campaigns, which will provide large distance datasets over the full sky and with known selection effects.

During this presentation I will present statistical methods used for peculiar velocity analysis so as forecasts for future surveys in which IN2P3 is involved.

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