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The Renaissance of Cosmography: new challenges from non standard cosmological probes

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Explaining the accelerated expansion of the Universe is one of the most challenging topic in physics today. Cosmography provides information about the evolution of the universe, assuming only that the space time geometry is described by the Friedman-Lemaitre-Robertson-Walker metric.Cosmography traditionally involves Taylor expansions of the observable quantities, and the results of this approach are independent from any hypothesis about the cosmological model at late-time epochs. However, this approach is weakened by the convergence problems of the Taylor polynomials at high redshifts. To overcome these problems, new expansion have been provided, as the rational Padé polynomials, which extend the convergence radius of the standard cosmographic series, or the Chebyshev polynomials. We perform a high-redshift analysis based not only on standard probes, as the Pantheon type Ia supernovae data set, but also on non standard cosmological probes, as the gamma-ray burst Hubble diagram, measurements of the Hubble parameter, quasar Hubble diagram. Our high-redshift cosmographic analysis confirms that the expansion of the universe currently accelerates; the estimation of the jerk parameter indicates a possible deviation from the standard ΛCDM cosmological model.

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