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Kinematic Constraints on Spatial Curvature from Supernovae Ia and Cosmic Chronometers

This work has an interesting approach to estimate the spatial curvature Ω_k from data independently of dynamical models is suggested, it was done through three kinematic parameterizations of the comoving distance ($D_C(z)$) with second degree polynomial, of the Hubble parameter ($H(z)$) with a second degree polynomial and of the deceleration parameter ($q(z)$) with first order polynomial. All these parameterizations are done as function of redshift z. We used SNe Ia dataset from Pantheon compilation with 1048 distance moduli estimated on the range $0.01 < z < 2.3$ with systematic and statistical errors and a compilation of 31 $H(z)$ data estimated from cosmic chronometers. The spatial curvature found for $D_C(z)$ parametrization was $\Omega_k = -0.49^{+0.14+0.29}_{-0.14-0.27}$. The parametrization for deceleration parameter $q(z)$ resulted in $\Omega_k = -0.08^{+0.21+0.54}_{-0.27-0.45}$. The $H(z)$ parametrization had incompatibilities between $H(z)$ and SNe Ia data, so these analyses were not combined. The $q(z)$ parametrization is compatible with the spatially flat Universe as predicted by many inflation models and data from CMB, while the $D_C(z)$ parametrization favored a slightly closed Universe. This type of analysis may be interesting as it avoids any bias because it does not depend on assumptions about the matter content for estimating Ω_k.

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