Mathematical Physics

Coupling of gravity to matter, spectral action and cosmic topology

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We consider a model of modified gravity based on the spectral action functional, for a cosmic topology given by a spherical space form, and the associated slow-roll inflation scenario. We consider then the coupling of gravity to matter determined by an almost commutative geometry over the spherical space form. We show that this produces a multiplicative shift of the amplitude of the power spectra for the density fluctuations and the gravitational waves, by a multiplicative factor equal to the total number of fermions in the matter sector of the model. We obtain the result by an explicit nonperturbative computation, based on the Poisson summation formula and the spectra of twisted Dirac operators on spherical space forms, as well as by a heat-kernel computation.

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