

Abstract Submitted  
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**Cosmic Microwave Background Constraint on the Rotation of the Universe** SHI CHUN SU, MING CHUNG CHU, The Chinese University of Hong Kong — Models of a rotating universe have been studied widely since Gödel [1], who showed an example that is consistent with General Relativity (GR). By now, rotating universes have been discussed comprehensively in the framework of some types of Bianchi's models, such as Type V, VII and IX [2,3]. However, most of those models are ruled out by cosmological data, such as those of Cosmic Microwave Background Anisotropies (CMB), which strongly prefers a homogeneous and isotropic model. As a result, it is crucial to discuss the rotation of the universe as a perturbation in the Robertson-Walker metric and to constrain the rotating speed by cosmological data. Here, we will study the effects of rotation perturbations on CMB in a  $\Lambda$ -CDM universe. We derive the general form of the metric (up to 2nd- order perturbations) which is compatible with the rotation perturbation in a  $\Lambda$ -CDM universe. By comparing the 2nd- order Sachs-Wolfe effect due to the rotation with the CMB data, we can then constrain the angular speed of the rotation. Reference: [1] K. Gödel, Rev. Modern Phys. 21 (1949) 3, [2] S. Hawking, Mon. Not. R. astr. Soc. 142 (1969) 129, [3] J. D. Barrow et al., Mon. Not. R. astr. Soc. 213 (1984) 917

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