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**Coherent spin dynamics under single mode approximation in a dipolar spin-1 Bose-Einstein condensate**<sup>1</sup> WENXIAN ZHANG, School of Physics and Technology, Wuhan University, Wuhan, Hubei 430072, China, BOYUAN NING, Department of Optical Science and Engineering, Fudan University, Shanghai 200433, China — Spin interactions, including the spin exchange and the magnetic dipolar interaction between ultracold atoms, are of key importance for high precision measurements utilizing dipolar spinor Bose condensates. Under the single spatial mode approximation in the framework of the mean field theory, we investigate analytically the spin mixing dynamics in a dipolar spin-1 Bose condensate ( $^{87}\text{Rb}$  or  $^{23}\text{Na}$ ) with both the spin exchange interaction and the magnetic dipolar interaction. We discuss the evolutions of the fractions of the three components, the spin, and the energy transfer between the spin exchange interaction and the magnetic dipolar interaction. The effects of the magnetic dipolar interaction on the coherent spin dynamics are explored in a systematic way. Preliminary numerical results on the validity of the single mode approximation are also presented.

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