

Abstract Submitted
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Preserving squeezed spin states of a spin-1 Bose-Einstein condensate with rotary echoes¹ WENXIAN ZHANG, JUN ZHANG, YINGYING HAN, PENG XU, School of Physics and Technology, Wuhan University, Wuhan, Hubei 430072, China — A challenge in precision measurement with squeezed spin state arises from the spin dephasing due to stray magnetic fields. To suppress such environmental noises, we employ a continuous driving protocol, rotary echo, to enhance the spin coherence of a spin-1 Bose-Einstein condensate in stray magnetic fields. Our analytical and numerical results show that the squeezed spin states are preserved for a significantly long time, compared to the free induction decay time, if the magic condition $h\tau = m\pi$ is met with h the pulse amplitude and τ pulse width. In particular, both the spin average and the spin squeezing, including the direction and the amplitude, are simultaneously fixed for a squeezed spin state. Our results provide a practical way to implement quantum measurements based on a spin-1 condensate utilizing a squeezed spin state.

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