

## **Stern-Gerlach Force in Quantum Magnetic Field and Schrodinger's Cat**

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**Abstract :** Quantum entanglement plays a fundamental role in our understanding of counter-intuitive aspects of quantum reality. If classical physics is an approximation of quantum physics, then quantum entanglement should persist at a macroscopic scale. In this paper, a thought experiment is presented where a free falling spin polarized Bose-Einstein condensate interacts with a quantum superimposed magnetic field of nonzero gradient. In contrast to the semiclassical Stern-Gerlach experiment, the magnetic field and the spin degrees of freedom both are considered to be quantum mechanical in a generalized scenario. As a consequence, a Bose-Einstein condensate can be prepared at distinct locations in space in a sense of quantum superposition. In addition, the generation of Schrodinger-cat like quantum states shall be presented.

**Keywords :** Schrodinger-cat quantum states, macroscopic entanglement, macroscopic quantum fields, foundations of quantum physics

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