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【402】 Einstein-Podolsky-Rosen steering between spatially separated regions in Bose-Einstein condensates

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Many-body entanglement is an active field of research due to both its fundamental aspects and its potential applications in quantum information processing and metrology. We study correlations between spins in spatially separated regions (A and B) in a ^{87}Rb Bose-Einstein condensate which violate an EPR steering inequality.

Such correlations allow one to predict the results of non-commuting variables in B from identical measurements in A with an inferred uncertainty product smaller than the Heisenberg relation in B. This un-intuitive feature not only provides a stringent test of quantum mechanics but it could also be used to measure spatially dependent quantities with increased sensitivity.

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