Abstract Submitted
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Neutron interferometry with cold stage[1] TAISIYA MINEEVA, Institute for Quantum Computing, M ARIF, M.G. HUBER, National Institute of Standards and Technology, C.B. SHAHI, Tulane University, C.W. CLARK, Joint Quantum Institute, D.G. CORY, J. NSOFINI, D. SARENAC, D.A. PUSHIN, Institute for Quantum Computing — Neutron interferometry (NI) is amongst the most precise methods for characterizing neutron interactions by measuring the relative difference between two neutron paths, one of which contains a sample-of-interest. Because neutrons carry magnetic moment and are deeply penetrating, they are excellent probes to investigate properties of magnetic materials. The advantage of NI is its unique sensitivity which allows to directly measure magnetic and structural transitions in materials. Up to now NI has been sparingly used in material research due to its sensitivity to environmental noise. However, recent successes in implementing Quantum Error Correction principles lead to an improved NI design making it robust against mechanical vibrations. Following these advances, a new user facility at the National Institute for Standards and Technology was built to study condensed matter applications, biology and quantum physics. Incorporating cold sample stage inside NI is the first of its kind experiment which can be carried out on large range of temperatures down to 4K. Upon successful realization, it will open new frontiers to characterize magnetic domains, phase transitions and spin properties in a variety of materials such as, for example, iron-based superconductors and spintronic materials.

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