Abstract Submitted
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Neutron interferometry for precise characterization of quantum systems[1] DUSAN SARENAC, Institute for Quantum Computing, CHANDRA SHAHI, Tulane University, TAISIYA MINEEVA, CHRISTOPHER J. WOOD, Institute for Quantum Computing, MICHAEL G. HUBER, MUHAMMAD ARIF, National Institute of Standards and Technology, CHARLES W. CLARK, Joint Quantum Institute, DAVID G. CORY, DMITRY A. PUSHIN, Institute for Quantum Computing — Neutron interferometry (NI) is among the most precise techniques used to test the postulates of quantum mechanics. It has demonstrated coherent spinor rotation and superposition, gravitationally induced quantum interference, the Aharonov-Casher effect, violation of a Bell-like inequality, and generation of a single-neutron entangled state. As massive, penetrating and neutral particles neutrons now provide unique capabilities in classical imaging applications that we seek to extend to the quantum domain. We present recent results on NI measurements of quantum discord in a bipartite quantum system[2] and neutron orbital angular momentum multiplexing,[3] and review progress on our commissioning of a decoherence-free-subspace NI user facility at the NIST Center for Neutron Research.[4]

[1]Supported in part by CERC, CIFAR, NSERC and CREATE.
[2]"Quantum correlations in a noisy neutron interferometer," C. J. Wood *et al., Phys. Rev. A* **90**, 032315 (2014)
[3]"Controlling neutron orbital angular momentum," C. W. Clark *et al., Nature* **525**, 504 (2015)
[4]"Experimental realization of decoherence-free subspace in neutron interferometry," D. A. Pushin *et al., Phys. Rev. Lett.* **107**, 150401 (2011)

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