Abstract Submitted
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Neutron Interferometric Search for Chameleon Dark Energy BENJAMIN HEACOCK, North Carolina State University, INDEX COLLABORATION[1] — The chameleon model for dark energy proposed by Khoury and Weltman is one of the only theories of dark energy which can be tested using laboratory experiments. The theory consists of a nonlinear scalar field whose range and intensity is a sensitive function of the local matter density, with the field becoming nonzero over ranges greater than 100 microns in only low density regions of space. We are searching for the induced phase shift due to a coupling of the chameleon to matter using neutron interferometry. By placing a two-chamber gas cell inside the neutron interferometer, we measure the neutron phase difference between low pressure (0.00025 torr) and higher pressure (0.1 torr) helium gas. The chameleon field is predicted to be suppressed only at the higher pressure, resulting in a phase from the chameleon on the low pressure side of the chamber. A double-difference technique is used to subtract the phase shift from the gas and chamber walls. We will discuss this experiment, ran at the NIST Center for Neutron Research, and present current constraints on the chameleon field. J. Khoury and A. Weltman, Phys. Rev. D 69, 044026 (2004) J. Khoury and A. Weltman, Phys. Rev. Lett. 93, 171104 (2004)

[1]Interferometric Dark Energy eXperiment

Benjamin Heacock
North Carolina State University

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