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New constraints on exotic spin- and velocity-dependent interactions of polarized electrons with an atomic magnetometer.¹ YOUNG JIN KIM, PINGHAN CHU, IGOR SAVUKOV, SHAUN NEWMAN, Los Alamos National Laboratory — Many theoretical extensions of the Standard Model of particle physics predicted exotic spin-dependent interactions between fermions mediated by new fundamental spin-0 or spin-1 bosons such as the axion and axionlike particles. The new bosonic particles may explain several important unsolved mysteries in physics, e.g., matter-antimatter asymmetry and the existence of the dark matter. Recently, we conducted a search for exotic spin- and velocity-dependent interactions for polarized electrons. The experiment is based on a high-sensitivity atomic magnetometer containing an optically polarized atomic vapor, which serves as both a source of polarized electrons and a magnetic-field detector. This approach aims to detect magnetic-fieldlike effects from the exotic interactions between the polarized electrons in an atomic magnetometer vapor cell and unpolarized nucleons of a closely located solid-state mass. In this talk, we report new experimental constraints on the exotic interactions.

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