

Abstract Submitted
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Weak values of spin and momentum in atomic systems.¹ ROBERT FLACK, BASIL HILEY, PETER BARKER, VINCENZO MONACHELLO, JOEL MORLEY, University College London — Weak values have a long history and were first considered by Landau and London in connection with superfluids. Hirschfelder called them sub-observables and Dirac anticipated them when discussing non-commutative geometry in quantum mechanics. The idea of a weak value has returned to prominence due to Aharonov, Albert and Vaidman showing how they can be measured. They are not eigenvalues of the system and can not be measured by a collapse of the wave function with the traditional Von Neumann (strong) measurement which is a single stage process. In contrast the weak measurement process has three stages; preselection, weak stage and finally a post selection. Although weak values have been observed using photons and neutrons, we are building two experiments to observe weak values of spin and momentum in atomic systems. For spin we are following the method outlined by Duck et al which is a variant on the original Stern-Gerlach experiment using a metastable, 2^3S_1 , form of helium. For momentum we are using a method similar to that used by Kocsis with excited argon atoms in the 3P_2 state, passing through a 2-slit interferometer. The design, simulation and re

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