

Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Observing the average momentum flow lines of particles in a double slit interferometer¹ JOEL MORLEY, PETER EDMUNDS, PETER BARKER, University College London, BASIL HILEY, Birkbeck University, ROB FLACK, VINCENZO MONACHELLO, University College London, EXPERIMENTAL WEAK VALUES TEAM — The 1988 work on weak values by Aharonov et al, introduced a new kind of quantum variable [1]. This created new perspectives when it came to the limits of quantum uncertainty. More recently, Kocsis et al [2] had used these techniques experimentally, claiming to have reconstructed the trajectories of photons after passing through an interferometer. This was done without destroying the interference pattern, an act apparently forbidden by standard quantum mechanics. We aim to replicate Kocsis experiment using atoms. A ready made magneto-optical trap can routinely cool and trap, metastable argon atoms to the mK range[3]. The ultra-cold temperatures offers particles with a large De Broglie wavelength. Here we present our intended method of reconstructing the atoms trajectories, while maintaining the interference pattern, as they fall below the slits.

References

- [1] Y. Aharonov, D. Z. Albert, L. Vaidman, *Phys. Rev. Lett.* **60**, 1351-4 (1988)
- [2] S. Kocsis et al., *Science*, **332**, 1170-73 (2011)
- [3] P. Edmunds, P. Barker, *Phys. Rev. Lett.* **113**, 183001 (2014)

¹Thanks to the John E. Fetzer Memorial Fund

Joel Morley
University College London

Date submitted: 07 Apr 2016

Electronic form version 1.4