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Proposal for measuring the optical version of the He-McKellar-Wilkens phase using an atom interferometer

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An electric dipole moving in a magnetic field acquires a geometric phase known as the He-McKellar-Wilkens (HMW) phase, which is the electromagnetic dual of the Aharonov-Casher phase. The HMW phase was first measured in 2012 using an atom interferometer [1]. In that experiment the electric and magnetic fields were static. We propose a modification where these fields are generated by laser beams.

[1] Lepoutre et al, PRL 109, 120404 (2012)

Keyword-1

Atom interferometry

Keyword-2

Geometric phase

Keyword-3

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