

Abstract Submitted
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A simple and versatile system for simulating non-abelian gauge fields¹ DANIEL BRAUN, University Toulouse and CNRS — We consider a single, harmonically trapped atom with internal hyperfine structure in an external magnetic field. We show that by a simple canonical transformation the system can be mapped to a charged particle moving in an abelian or non-abelian gauge potential. The form of the gauge potential can be rather freely chosen by suitably adjusting gradients of the magnetic field components. We demonstrate in particular how Rashba or Linear-Dresselhaus couplings can be implemented, and how *Zitterbewegung* of a Dirac particle can be simulated. We study the *Zitterbewegung* in some detail and show that the 2D harmonic confinement potential prevents the *Zitterbewegung* from decohering, thus allowing its observation on long time scales.

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Daniel Braun
University Toulouse and CNRS

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