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How to dress radio-frequency photons with tunable momentum<sup>1</sup> BORIS SHTEYNAS, JEONGWON LEE, FURKAN CAGRI TOP, JUN-RU LI, ALAN O. JAMISON, Massachusetts Institute of Technology, GEDIMINAS JUZELINAS, Institute of Theoretical Physics and Astronomy, Vilnius University, WOLFGANG KETTERLE, Massachusetts Institute of Technology — We demonstrate how the combination of oscillating magnetic forces and radio-frequency (RF) pulses endows RF photons with tunable momentum. We observe velocity-selective spinflip transitions and the associated Doppler shift. This realizes the key component of purely magnetic spin-orbit coupling schemes for ultracold atoms, which does not involve optical transitions and therefore avoids the problem of heating due to spontaneous emission.

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