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Analog simulation of Weyl particles with cold atoms MIHAIL RABINOVIC, DANIEL SUCHET, THOMAS REIMANN, NORMAN KRETZSCHMAR, FRANZ SIEVERS, CHRISTOPHE SALOMON, Laboratoire Kastler Brossel ENS, JONATHAN LAU, CARLOS LOBO, University of Southampton, OLGA GOULKO, University of Massachusetts, FREDERIC CHEVY, Laboratoire Kastler Brossel ENS — The high degree of control of the properties of ultracold gases offers the possibility to study experimentally unconventional many-body systems. An example is given by massless relativistic Weyl fermions, which are of particular interest in high energy and condensed matter physics, where they emerge in the form of low energy excitations of exotic compounds like TaAs. The particular case of harmonically trapped Weyl particles can be mimicked by a laser-cooled cloud of ^{6}Li trapped in a magnetic quadrupole potential. The non-separability of this particular potential enables a quasi-thermalization of the single particle distribution function even in the absence of interactions. Surprisingly, the dynamics features an effective decoupling between the strong trapping axis and the weak trapping plane. We studied both, numerically and experimentally, the relaxation of the excited cloud towards its equilibrium distribution, mapping this dynamics directly to the case of non-interaction massless particles in a harmonic potential. D. Suchet, M. Rabinovic, T. Reimann, et al.*submitted* (2016).

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