Observing *Zitterbewegung* in Ultracold Atoms

J.Y. VAISHNAV, CHARLES W. CLARK, Joint Quantum Institute, National Institute of Standards and Technology, Gaithersburg MD 20899 — We propose an optical lattice scheme which would permit the experimental observation of *Zitterbewegung* (ZB) with ultracold, neutral atoms. A four-level “tripod” variant of the usual setup for stimulated Raman adiabatic passage (STIRAP) has been proposed for generating non-Abelian gauge fields. [1] Dirac-like Hamiltonians, which exhibit ZB, are simple examples of such non-Abelian gauge fields; we show how a variety of them can arise, and how ZB can be observed, in a tripod system. We predict that the ZB should occur at experimentally accessible frequencies and amplitudes.