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Stabilizing the false vacuum: Mott skyrmions[1] MÁRTON KANÁSZ-NAGY, Harvard University and Budapest University of Technology and Economics, BALÁZS DÓRA, Budapest University of Technology and Economics, EUGENE DEMLER, Harvard University, GERGELY ZARÁND, Budapest University of Technology and Economics — Topological excitations keep fascinating physicists since many decades. While individual vortices and solitons have been observed in many areas of physics, their intriguing higher dimensional topological relatives, skyrmions remained mostly elusive. In particular, earlier attempts to create stable individual skyrmions in ultracold atomic experiments suffered from important instabilities: skyrmions have a tendency to shrink or expand, and to slip away from the atomic trap. In this work, we propose that loading a three-component nematic superfluid, such as ^{23}Na, into a deep optical lattice and thereby creating an insulating core, one can create topologically stable individual skyrmions, and investigate their properties in detail. Furthermore, the spectrum of the excitations of the superfluid and their quantum numbers change dramatically in the presence of the skyrmion, and they reflect the presence of a trapped monopole, as imposed by the skyrmion's topology.

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