# Vortex nucleations in spinor Bose condensates under localized synthetic magnetic fields

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Quantum systems subject to gauge fields are appealing in modern physics, and such systems are often accompanied by appearance of quantized vortices. We employ synthetic azimuthal gauge potentials acting as light-induced effective rotations for spinor Bose condensates. We then investigate novel phenomena of vortex nucleations under the resulting centrically-localized synthetic magnetic fields. We identify the main mechanism of vortex nucleations as the dynamical instability of low-energy excitations associated with vortex splitting and pair creation in internal spin components, respectively, which occur near the center of condensates. This is distinct from the vortex nucleations in both scalar condensates under mechanical stirring and spinor condensates under spatially uniform synthetic magnetic fields, both of which the vortices nucleate from the cloud edge due to surface mode excitations. Our experimental data agrees with the time-dependent Gross-Pitaevskii equation (GPE) simulations and reveals a novel type of vortex nucleations mechanism.