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Unusual polarization patterns in flat epitaxial ferroelectric nanoparticles IVAN NAUMOV, ALEXANDR BRATKOVSKY, Hewlett-Packard Laboratories — We investigate the effects of a lattice misfit strain on a ground state and polarization patterns in flat perovskite nanoparticles (nanoislands of $BaTiO_3$ and $PbZr_{0.5}Ti_{0.5}O_3$) with the use of an *ab-initio* derived effective Hamiltonian. We show that the strain strongly controls the balance between the depolarizing field and the polarization anizotropy in determining the equilibrium polarization patterns. Compressive strain favors 180 ^{0} stripe/tweed domains while a tensile strain leads to in-plane vortex formation, with the unusual intermediate phase (s) where both ordering motifs coexist [1]. The results may allow to explain contradictions in recent experimental data for ferroelectric nanoparticles. [1] Ivan Naumov and Alexander M. Bratkovsky, Phys. Rev. Lett. 101, 107601 (2008).

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