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**Confined vortex phase in superconductor-ferromagnet nanocomposites**[1] MILORAD MILOSEVIC, Departement Fysica, Universiteit Antwerpen, Belgium, MAURO DORIA, Instituto de Física, Universidade Federal do Rio de Janeiro, Brazil, FRANCOIS PEETERS, Departement Fysica, Universiteit Antwerpen, Belgium — In the fifties, Abrikosov found the coexistence of superconductivity with an external magnetic field in the form of vortices, quantized filaments that cross the material. The puzzling properties of the recently discovered ferromagnetic superconductors are indicative of vortices, but stemming from the *internal* magnetic field. Here we analyze this latter phenomenon and propose a new superconducting phase, made of *confined vortex lines*, prior to the onset of experimentally visible spontaneous vortex phase. Similarly to exotic superconductors, internal complexes of vortex loops may also arise around embedded nanomagnets in artificial superconducting hybrids, where high density of magnetic particles can lead to a disordered vortex phase resembling a *vortex glass*. Our simulations in the Ginzburg-Landau framework also show the remarkable, three-dimensional dynamic effects of the Lorentz force on vortex loops in applied dc current. This provides unique method for the experimental detection of the confined phase through transport measurements, both for bulk and mesoscopic samples.

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