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# Superconducting multi-vortices and a novel BPS bound in chiral perturbation theory

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## Content

We derive a novel BPS bound from chiral perturbation theory minimally coupled to electrodynamics at finite isospin chemical potential. At a critical value of the isospin chemical potential, a system of three first-order differential field equations (which implies the second-order field equations) for the gauge field and the hadronic profile can be derived from the requirement to saturate the bound. These BPS configurations represent magnetic multi-vortices with quantized flux supported by a superconducting current. The corresponding topological charge density is related to the magnetic flux density, but is screened by the hadronic profile. Such a screening effect allows to derive the maximal value of the magnetic field generated by these BPS magnetic vortices, being Bmax = 2, 04 $\times$ 1014 G. The solution for a single BPS vortex is discussed in detail, and some physical consequences, together with the comparison with the magnetic vortices in the Ginzburg-Landau theory at critical coupling, are described.

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