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Mathematical Physics

Existence of Dyons in Minimally Gauged Skyrme Model via Constrained Minimization

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(Submitted on 1 Jul 2011)

We prove the existence of electrically and magnetically charged particlelike static solutions, known as dyons, in the minimally gauged Skyrme model developed by Brihaye, Hartmann, and Tchrakian. The solutions are spherically symmetric, depend on two continuous parameters, and carry unit monopole and magnetic charges but continuous Skyrme charge and non-quantized electric charge induced from the 't Hooft electromagnetism. The problem amounts to obtaining a finite-energy critical point of an indefinite action functional, arising from the presence of electricity and the Minkowski spacetime signature. The difficulty with the absence of the Higgs field is overcome by achieving suitable strong convergence and obtaining uniform decay estimates at singular boundary points so that the negative sector of the action functional becomes tractable.

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