

Magnetic monopoles with an internal degree of freedom

Friday 19 July 2024 17:00 (15 minutes)

We present a general family of effective $SU(2)$ models with an adjoint scalar. We construct the Bogomol'nyi-Prasad-Sommerfield (BPS) limit and derive monopole solutions in analytic form. In contrast to the 't Hooft-Polyakov monopole, included here as a special case, these solutions tend to exhibit more complex energy density profiles. Typically, we obtain monopoles with a hollow cavity at their core where virtually no energy is concentrated; instead, most of the monopole's energy is stored in a spherical shell (in some cases with several "sub-shells") around its core. Most interestingly, however, we show that some of the analytic monopole solutions contain an unconstrained constant of integration that controls the monopole's energy density profile, while keeping its total energy (i.e., the mass) constant. Thus, it can be interpreted as an internal degree of freedom or as a new moduli space parameter.

Alternate track

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Primary authors: Dr BENEŠ, Petr (Czech Technical University in Prague (CZ)); Dr BLASCHKE, Filip (Czech Technical University in Prague (CZ))

Presenter: Dr BENEŠ, Petr (Czech Technical University in Prague (CZ))

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