

# Monopole Solutions in SU(2) Yang-Mills+Nonlinear Spinor Field Theory

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**Abstract:** Monopole solutions in SU(2) Yang-Mills theory which interact with massive nonlinear spinor fields described by the nonlinear Dirac equation are obtained. These solutions describe a magnetic monopole created by a spherical lump of nonlinear spinor fields.

It is shown that the monopole solutions obtained differs in principle from the 't Hooft-Polyakov monopole so that its: (a) topologically trivial; (b) the radial magnetic field of which decreases as  $r^{-3}$ ; (c) for its existence no need the Higgs field.

It is demonstrated that the energy spectrum of such a system possesses a global minimum, the appearance of which is due exclusively to the nonlinearity of the Dirac spinor fields. This global minimum can be considered as a mass gap, i.e., the energy difference between a vacuum and the next lowest energy state. A similar minimum was found for the energy spectrum of regular solutions to the nonlinear Dirac equation and this minimum called as "the lightest stable particle".

**Keywords:** non-Abelian SU (2) Yang-Mills theory; nonlinear Dirac equation; scalar Higgs field; monopole; energy spectrum; mass gap

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