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The profile of non-standard cosmic strings

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Content

In the Standard Model of particle physics, there is a global and exact $U(1)$ symmetry. It is related to the conservation of the difference between the lepton number L and the baryon B number. However, this is strange since an exact symmetry is only natural when it is local. In this project, we promote this $U(1)$ to be a local or gauge symmetry. We combine it with the Standard Model $U(1)$ symmetry related to the weak hypercharge, to be part of a greater symmetry which we call $U(1)'_Y$. In order to implement gauge invariance we introduce a gauge field called A. However, the symmetry $U(1)'_Y$ introduces gauge anomalies that are removed by adding a right-handed neutrino to each lepton generation. In addition, the mass of the right-handed neutrino is given by means of a new Higgs field coupled to the Standard Model Higgs field. This BSM model enables a type of topological defect known as cosmic strings. We solve the system of field equations for the Higgs fields, and the gauge field and look for cosmic string solutions.

Summary

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