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Dark energy as a fixed point of the Einstein Yang-Mills Higgs Equations

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We study the Einstein Yang-Mills Higgs equations in the SO(3) representation on a isotropic and homogeneous flat Universe, in the presence of radiation and matter fluids. We map the equations of motion into an autonomous dynamical system of first-order differential equations and we find the equilibrium points. We show that there is only one stable fixed point that corresponds to an accelerated expanding Universe in the future. In the past, instead, there is an unstable fixed point that implies a stiff-matter domination. In between, we find three other unstable fixed points, corresponding, in chronological order, to radiation domination, to matter domination, and, finally, to a transition from decelerated expansion to accelerated expansion. We solve the system numerically and we confirm that there are smooth trajectories that correctly describe the evolution of the Universe, from a remote past dominated by radiation to a remote future dominated by dark energy, passing through a matter-dominated phase.

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