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Self-interactions can (also) destabilize bosonic stars

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We study the dynamical stability of Proca-Higgs stars, in spherical symmetry. These are solutions of the Einstein-Proca-Higgs model, which features a Higgs-like field coupled to a Proca field, both of which minimally coupled to the gravitational field. The corresponding stars can be regarded as Proca stars with self-interactions, while avoiding the hyperbolicity issues of self-interacting Einstein-Proca models. We report that these configurations are stable near the Proca limit in the candidate stable branches, but exhibit instabilities in certain parts of the parameter space, even in the candidate stable branches, regaining their stability for very strong self-interactions. This shows that for these models, unlike various examples of scalar boson stars, self-interactions can deteriorate, rather than improve, the dynamical robustness of bosonic stars.

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