Non-linear stability of rotating Proca stars

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Proca stars are a vector analogue of the well-known (scalar) boson stars. Only recently (surprisingly) they have been reported in the literature, wherein both spherically symmetric and rotating boson stars were constructed. The model used therein was that of a complex Proca field minimally coupled to Einstein's gravity. Spherical boson and Proca stars have been extensively studied in the non-linear regime, but no numerical simulations of rotating bosonic stars have been performed. We present the first fully non-linear evolutions of stable and unstable rotating Proca stars. Our results show that excited solutions can migrate to the stable fundamental branch or collapse to a Kerr black hole.