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Scaling Density of Axion Strings ASIER LOPEZ-EIGUREN, Tufts University, MARK HINDMARSH, University of Helsinki, JOANES LIZARRAGA, JON URRESTILLA, University of the Basque Country — In the QCD axion dark matter scenario with post-inflationary Peccei-Quinn symmetry breaking, the number density of axions, and hence the dark matter density, depends on the length of string per unit volume at cosmic time t, by convention written ζ/t^2. The expectation has been that the dimensionless parameter ζ tends to a constant ζ_0, a feature of a string network known as scaling. It has recently been claimed that in larger numerical simulations ζ shows a logarithmic increase with time. This case would result in a large enhancement of the string density at the QCD transition, and a substantial revision to the axion mass required for the axion to constitute all of the dark matter. With a set of new simulations of global strings we compare the standard scaling (constant-ζ) model to the logarithmic growth. We conclude that the apparent corrections to ζ are artefacts of the initial conditions, rather than a property of the scaling network. The residuals from the constant-ζ (linear ξ) fit also show no evidence for logarithmic growth, restoring confidence that numerical simulations can be simply extrapolated from the Peccei-Quinn symmetry-breaking scale to the QCD scale. In this scenario the axion mass should be increased by about50%

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