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## **Fuzzy dark matter from the axiverse: how viable?**

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In recent years the idea of bosonic ultralight CDM (also called fuzzy dark matter, FDM) has been proposed, in one of its prominent versions it states that DM is made of ultralight axion-like particles that form halos as Bose-Einstein condensates. In this theory each axionic particle can develop structures on de Broglie scale thanks to gravitational effects. A prominent soliton, i.e. a state where self-gravity is balanced by the effective pressure arising from the uncertainty principle, develops at the center of every bound halo. The extremely high value of the decay constant together with the possible multiple axionic nature of FDM have been claimed to be a possible sign in favour of the string axiverse, where a plenitude of axion like particle naturally arise in 4D effective theory. I will point out that obtaining a fuzzy dark matter axion with the correct mass and decay constant is a big challenge for string theory, being also its existence in contrast with WGC .

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