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SUNny gluonia as DM

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We investigate the possibility that the dark matter candidate is from a pure non-abelian gauge theory of the hidden sector, motivated in large part by its elegance and simplicity. The dark matter is the lightest bound state made of the confined gauge fields, the hidden glueball. We point out this simple setup is capable of providing rich and novel phenomena in the dark sector, especially in the parameter space of large N . They include self-interacting and warm dark matter scenarios, Bose-Einstein condensation leading to massive dark stars possibly millions of times heavier than our sun giving rise to gravitational lensing effects, and indirect detections through higher dimensional operators as well as interesting collider signatures. Non-perturbative relevant studies to further our understandings of these uniquely simple non-abelian gauge theories are suggested. This talk is based on arXiv:1602.00714 [to appear in Phys. Rev. D] with Yue Zhang [CIT] and more in progress with him.

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