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Composite objects in quantum (super)gravity

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It has been a long entertained idea that self-bound gravitons, so-called geons, could be a dark matter candidate or form (primordial) black holes. The development of viable candidates for quantum gravity allows now to investigate these ideas. Analytic methods show that the description of geons needs to be based on composite operators made out of the graviton field. We present results from a numerical investigation into this idea using causal dynamical triangulations, an ab-initio non-perturbative definition of quantum gravity based on general relativity, and accessible in lattice-gauge-theory-like simulations. Our results suggest an interesting dependence on cosmological time and other unexpected features. We also compare the results to the expectations from analytic methods. Finally, we extend the analytic part of the setting to a supergravity scenario. This provides hints which, if confirmed, could explain why supersymmetry may in a realistic universe in principle not be observable at low (collider) energy scales.

Secondary track

T01 - Astroparticles, Gravitation and Cosmology

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