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Graviballs and Dark Matter

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In JHEP 11 (2020) 159, we have investigated the possible existence of graviballs, a system of bound gravitons, and show that two gravitons can be bound together by their gravitational interaction. This conclusion is consistent with older classical studies on gravitational geons. Our calculations rely on the formalism and techniques of quantum field theory, specifically on low-energy quantum gravity. By solving numerically the relativistic equations of motion, we access to the space-time dynamics of the graviball formation. The interest of our study is twofold:

1) Tree level calculations in quantum gravity are equivalent to general relativity. Consequently, the graviball is a prediction of general relativity and should exist (it shares similarities with black holes).
2) Graviballs offer a natural candidate for dark matter since they are massive and essentially invisible.

New results with more than 2 gravitons forming the graviball will be presented. We will discuss the stability of the graviball and phenomena similar to the black hole evaporation.

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