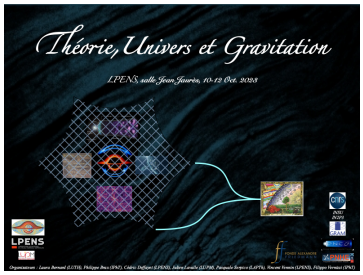


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# Jordan Gué (Observatoire de Paris): Violation of the equivalence principle induced by oscillating rest mass and its detection in atom interferometers

*mercredi 11 octobre 2023 11:30 (20 minutes)*

We present a theoretical investigation of the expected signal produced by free falling atoms with time oscillating mass and transition frequency. These oscillations could be produced in a variety of models, in particular, models of scalar dark matter non universally coupled to the standard matter such as axion-like particles and dilatons. Performing the exact and rigorous calculations, we show that, on one hand, two different atomic species would accelerate at a different rate; and on the other hand, they would produce a non-zero differential phase shift in an atom interferometer. In this framework, we show that already existing experiments could put the best laboratory constraints on these dark matter models. Additionally, we propose an experimental variation of compact gradiometers which would be much more sensitive to these dark matter candidates and which could test the universality of free fall at an unprecedented level.

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