Searches for a violation of the equivalence principle induced by light dark matter

Aurelien Hees*[1], Michel Abgrall[1], Sébastien Bize[1], Jocelyne Guéna[1], Olivier Minazzoli[2], Etienne Savalle[1], and Peter Wolf[1]

[1]Systèmes de Référence Temps Espace – Université Pierre et Marie Curie - Paris 6, Institut national des sciences de lÚnivers, Observatoire de Paris, Centre National de la Recherche Scientifique : UMR8630, Institut national des sciences de lÚnivers – France

[2]Observatoire de la Côte dÁzur – Centre National de la Recherche Scientifique : UMS2202 – France

Résumé

Motivated by the unsuccessful detection of Dark Matter at high energy with particle accelerator, new model of light bosonic dark matter has recently been proposed. In this model, Dark Matter is made of a scalar particle which couples non-minimally to the standard matter, inducing violations of the Einstein Equivalence Principle. Such violations can be searched for using a wide range of measurements such as measurements of the universality of free fall in the lab and in space (with MICROSCOPE) and such as measurements made with atomic sensors.

In this talk, I will present some of the theoretical features of this model of Dark Matter, insisting on the differences between the case where it is linearly or quadratically coupled to standard matter. I will also present how existing measurements of the UFF constrained the coupling coefficients between Dark Matter and Standard matter. I will finally present atomic measurements from the dual atomic Rb/Cs fountain from the SYRTE and discuss how these provide one of the best existing constraint on such models.

*Intervenant