Institut Henri Poincaré
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String Theory in Greater Paris

Rencontres Théoriciennes

“Supergravité, théorie des cordes et théorie M”

Jeudi 14 Mars 2019, 10:00

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Non-relativistic Gravity

In this talk I will discuss the expansion of general relativity in inverse powers of the speed of light. This expansion can be truncated at any desired order and, when truncated at the next- to-leading order, it can be used to derive an action principle for a diffeomorphism invariant description of non-relativistic gravity. This describes Newtonian gravity as well as strong gravity extensions thereof (e.g. due to time dilation effects). I will show how to couple such a theory to matter (point particles, scalar fields and fluids) and use this to show that the Tolman-Oppenheimer-Volkov star solution and the Friedmann equations can both be viewed as solutions to the equations of motion of matter coupled non-relativistic gravity. By looking at geodesics in a spherically symmetric background one can show that the phenomenon of perihelion precession is also described by this theory. Time permitting I will end with some comments about string and holographic extensions of these results.

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