

Speaker: Michael Vaz, Université Paris-Saclay
Title: Braking on the vacuum: linear and nonlinear quantum friction on a pair of revolving atoms
Date: Wednesday, June 17, 16.00 pm (s.t.)
Place: Seminar room 915

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The apparent time reversibility of a microscopic system is lost when its interaction with the environment is considered. Here, we have specifically studied the impact of the vacuum electromagnetic field on the dissipation of two coupled atomic oscillators moving in a circular path.

The model is based on a classical description of matter alongside quantum vacuum field correlations, directly obtained from the quantum field operators. It enables one to recover the existing results of van der Waals attraction force, for both zero-point and thermal fluctuations arising from the blackbody spectrum of vacuum. New results concerning friction linear in rotation speed are then obtained, in the near and far field regimes. In agreement with previous findings, the zero-temperature friction term linear in the rotation speed vanishes entirely, at all interatomic distances.

After presenting the model, we show new results on nonlinear quantum friction in the non-retarded regime. We then compare it with the linear thermal contribution, identifying novel thermodynamics properties associated with zero-point dissipation.