Measurement of short range forces using trapped cold atoms

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I will present a new experiment which aims at studying the short range interactions between a surface and atoms trapped in its vicinity. I will show how cold atoms confined in the wells of an optical standing wave can be used to probe the atom-surface potential, which will be measured with high sensitivity using atom interferometry techniques. The proposed scheme will allow the characterization of the Casimir-Polder interaction with unprecedented accuracy. Moreover, this experiment constitutes a test of gravity at short distances, which will put stringent bounds on a possible deviation from Newtonian gravity, or discover new short range interactions related to gravity, as described by several models based on unification theories.