



LABORATORY FOR ELEMENTARY-PARTICLE  
PHYSICS (LEPP)

# Theory Seminar

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## Quantum forces from the dark sector



Particles populating the dark sector can, under certain conditions, induce quantum forces between nucleons. Experiments sensitive to a fifth force can therefore be used to test the existence of dark particles. I will discuss bounds from quantum forces in the context of sub-GeV Dark Matter, focusing especially on those from molecular spectroscopy and neutron scattering. I will then discuss the case of chameleon-like particles,

for which we have recently introduced a treatment of quantum forces. The bounds obtained for all these dark particles are typically complementary from the existing ones.

Finally, since the dark sector is sometimes described by a low-energy effective field theory whose UV completion is either unspecified or very constrained, I will discuss a (yet unpublished) proposal of dark sector UV completion in which experimental bounds are expected to be systematically much looser. The framework is a slice of AdS<sub>5</sub> with the SM on the UV brane and the dark sector on the IR brane, whose scale can in principle be very low (e.g. sub GeV). I will describe the property of "opacity" of the IR region and show that it is enforced by the graviton continuum. The phenomenology of this warped UV completion is quite rich, including for instance fifth forces with a non integer behaviour, soft spherical events with high multiplicity, and periodic signals at colliders.

**Wednesday, March 13, 2019**

**2pm**

**301 Physical Sciences Building**