

**Seminar on**  
**THEORETICAL PARTICLE PHYSICS**

on Wednesday, 25 November 2015, at 2.00 p.m. s.t.  
Theresienstraße 37 / III, Seminar Room A318

Speaker: Joachim Brod  
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Title: "Renormalization Group Effects in Dark-Matter  
Direct Detection"

**Abstract**

The existence of dark matter is one of the few hints for physics beyond the standard model. If dark matter indeed has particle nature, then direct detection via scattering on atomic nuclei is one of the most promising discovery channels. Effective field theories are the appropriate framework to describe the scattering process, involving physics at very different energy scales.

The state of the art is to include also subleading (for instance, velocity-suppressed or spin-dependent) interactions, either in an attempt to resolve tensions between different experimental results, or to accommodate concrete models of dark matter. Here, electroweak corrections can have a large impact on the interpretation of data, via the mixing of suppressed into unsuppressed operators.

In this talk I report on our effort to provide a whole set of effective theories, connecting all relevant energy scales from the UV down to the nuclear scale. We also calculate the electroweak operator mixing for dark matter furnishing a general representation of the electroweak gauge group, and I will show preliminary results of our analysis.