



Contribution ID: 282

Type: **Oral presentation**

Limitation of EFT for DM interactions at the LHC

Thursday, 1 May 2014 09:50 (20 minutes)

We discuss the limitations to the use of the effective field theory approach to study dark matter at the LHC. We introduce and study a few quantities, which quantify the error made when using effective operators to describe processes with very high momentum transfer. Firstly, we study the full list of operators connecting fermion DM to

quarks and gluons, corresponding to integrating out a heavy mediator in the s-channel; secondly, we provide analytical results for the validity of the EFT description for both $\sqrt{s}=8$ TeV and 14 TeV; thirdly, we make use of a MonteCarlo event generator approach to assess the validity of our analytical conclusions. We apply our

results to revisit the current collider bounds on the ultraviolet cut-off scale of the effective field theory and show that these bounds are weakened once the validity conditions of the effective field theory are imposed.

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Session Classification: WG3: Electroweak Physics and Beyond the Standard Model

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