



Simplified models for dark matter searches at the LHC



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ABSTRACT

This document^a outlines a set of simplified models for dark matter and its interactions with Standard Model particles. It is intended to summarize the main characteristics that these simplified models have when applied to dark matter searches at the LHC, and to provide a number of useful expressions for reference. The list of models includes both s -channel and t -channel scenarios. For s -channel, spin-0 and spin-1 mediations are discussed, and also realizations where the Higgs particle provides a portal between the dark and visible sectors. The guiding principles underpinning the proposed simplified models are spelled out, and some suggestions for implementation are presented.

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1. Introduction

Gravitational effects on astrophysical scales give convincing evidence for the presence of dark matter (DM) in Nature, an

observation that is strongly supported by the large-scale structure of the Universe and measurements of the cosmic microwave background [1]. While the existence of DM thus seems well established, very little is known about the properties of the DM particle(s). To shed light on this question, three classes of search strategies are being employed: (i) direct detection in shielded underground detectors; (ii) indirect detection with satellites, balloons, and ground-based telescopes looking for signals of DM annihilation; (iii) particle colliders aiming at direct DM production.

[†] Primary contributor.^a Summary of the discussions and conclusions following from *Dark Matter @ LHC 2014*, held at Merton College, Oxford, on September 25–27, 2014.

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