1. **Record Nr.** UNINA9910404076503321

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Titolo	The Role of Halo Substructure in Gamma-Ray Dark Matter Searches
Pubbl/distr/stampa	MDPI - Multidisciplinary Digital Publishing Institute, 2020
ISBN	3-03936-045-0
Descrizione fisica	1 electronic resource (220 p.)
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia

Sommario/riassunto

An important, open research topic today is to understand the relevance that dark matter halo substructure may have for dark matter searches. In the standard cosmological model, halo substructure or subhalos are predicted to be largely abundant inside larger halos, for example, galaxies such as ours, and are thought to form first and later merge to form larger structures. Dwarf satellite galaxies—the most massive exponents of halo substructure in our own galaxy—are already known to be excellent targets for dark matter searches, and indeed, they are constantly scrutinized by current gamma-ray experiments in the search for dark matter signals. Lighter subhalos not massive enough to have a visible counterpart of stars and gas may be good targets as well, given their typical abundances and distances. In addition, the clumpy distribution of subhalos residing in larger halos may boost the dark matter signals considerably. In an era in which gamma-ray experiments possess, for the first time, the exciting potential to put to test the preferred dark matter particle theories, a profound knowledge of dark matter astrophysical targets and scenarios is mandatory should we aim for accurate predictions of dark matter-induced fluxes for investing significant telescope observing time on selected targets and for deriving robust conclusions from our dark matter search efforts. In this regard, a precise characterization of the statistical and structural properties of subhalos becomes critical. In this Special Issue, we aim to summarize where we stand today on our knowledge of the different

aspects of the dark matter halo substructure; to identify what are the remaining big questions, and how we could address these; and, by doing so, to find new avenues for research.