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Signals of ALP-Mediated Dark Matter and its UV Completions

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Axion-like particles (ALPs) offer a pathway for dark matter (DM) to interact with the Standard Model (SM) through a pseudoscalar mediator, addressing the absence of signals in direct detection experiments. This makes ALPs a compelling candidate for connecting DM to the SM. Our model assumes a Dirac fermion DM particle that couples through an ALP. The freeze-out mechanism suggests that the ALP effective field theory (EFT) may not suffice, motivating us to explore a KSVZ-like UV completion. We extend the ALP effective theory by considering interactions with scalar and pseudoscalar particles, including couplings to various SM vector bosons. Our calculations reveal that these interactions may have greater importance than previously anticipated. The outcome of our study will shed light on where the correct relic density can arise concerning direct bounds on DM and the ALP, providing insights into the UV completion of the model.

Mini Symposia (Invited Talks Only)

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