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Thermal Effects in Freeze-In Dark Matter Production

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One of the many compelling mechanisms for dark matter production is the freeze-in mechanism. In contrast to the more widely studied freeze-out scenario, freeze-in production is sensitive to thermal corrections, which can significantly impact the predicted dark matter abundance.

In this talk, we investigate the impact of thermal effects on dark matter production. We consider a model featuring a feebly interacting real scalar and a vector-like mediator. In particular, we analyze the contribution of multiple soft scatterings, an effect known as the Landau-Pomeranchuk-Migdal effect. We find that including this effect can modify the predicted dark matter relic abundance by up to 20%. In addition, we analyze the theoretical uncertainties arising from different approaches.

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