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Dark Matter Sommerfeld enhanced annihilation and bound-state decay at finite temperature

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Long-range interactions can lead to the existence of meta-stable bound-state solutions in the spectrum of WIMPs. During the last decade, it has been shown that the formation and subsequent decay of these bound states into SM particles gives a significant effect in the relic density computation, typically allowing for heavier DM masses. In this talk, I present some recent progress made in how to describe the chemical evolution of such systems beyond the Boltzmann framework, including environmental effects like charge screening and Landau damping. The latter two collective phenomena could lead to a melting or disappearance of the bound-state solutions, giving rise to non-trivial corrections in the relic density computation.

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