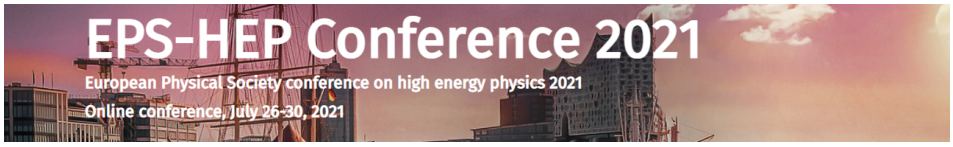

Contribution ID: **721** Type: **Parallel session talk**

Dark Matter bound states inside the early Universe plasma

Tuesday 27 July 2021 09:30 (20 minutes)

WIMPs at the TeV mass region or above experience long-range force effects, such as the existence of metastable bound state pairs (WIMPonium). These bound states contribute to the depletion of the relic abundance and therefore allow for even larger WIMP masses to compensate for the effect. In this talk, I present new next-to-leading order (NLO) zero and finite temperature corrections for unbroken non-Abelian electric dipole transitions between any singlet and adjoint two-particle states. After having proven the gauge invariance, infrared and collinear safety of the derived cross sections from thermal field theory, it is demonstrated that the early Universe plasma environment, which enters at NLO, leads to an enhancement of all rates in the full chemical network of existing bound states. Surprisingly, inside the plasma the hierarchy of rates is generically inverted. I.e. capture into the ground state for example can be the slowest process at relevant times, which is in clear contrast to expectations from the mostly considered LO computation. This gives us a novel understanding of the description of such systems. I also present some implications on the relic abundance.

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Session Classification: T03: Dark Matter

Track Classification: Dark Matter