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Cosmological abundances of electroweak Dark Matter models for future high-energy colliders MARCO COSTA, SALVATORE BOTTARO, LUDOVICO VITTORIO, Scuola Normale Superiore, and INFN, Pisa, DARIO BUTTAZZO, INFN, Pisa, ROBERTO FRANCESCHINI, Dipartimento di Fisica, Università Roma Tre, and INFN, Roma Tre, PAOLO PANCI, Dipartimento di Fisica, Università di Pisa, and INFN, Pisa, DIEGO REDIGOLO, Dipartimento di Fisica, Università di Firenze, and INFN, Firenze, and CERN, Theory Division — The simplest extension to the Standard Model (SM) which can accommodate a Dark Matter (DM) candidate consists of a single additional $SU(2)_L$ $n-$plet with 0 or milli-hypercharge. We require odd n in order to evade direct detection constraints and $n \leq 7$ to avoid electroweak Landau poles too close to the DM mass. In view of a possible future high-energy lepton collider, it is of prominent importance to precisely determine the DM mass required to reproduce the observed cosmological abundance. Such a computation relies on the precise determination of the DM annihilation cross-section, which includes non-perturbative effects like the Sommerfeld enhancement and especially the bound states formation. Up-to-date, a precise prediction of the DM mass is available only for the triplets and the Majorana 5-plet (A. Mitridate et al., JCAP, 05 (2017)). We refine and extend these computations in order to encompass all the $n-$plets up to $n = 7$. For such large electroweak charges the non-perturbative effects are enhanced, and push the predicted DM mass to tens of TeV. In particular, we find a thermal mass of 36 TeV and 44 TeV for Complex Scalar and Majorana 7-plets, respectively. These could both be probed at a multi-TeV muon collider.

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