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Toponium Phenomenology at the LHC

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Measurements of the di-leptonic top-antitop events at the LHC unraveled several important excesses. We examine the possibility that those excesses are consequences of the lack of non-perturbative enhancement of the production cross section near the t-tbar threshold. While sub-dominant in terms of total rates, so-far neglected toponium effects yield the additional production of di-leptonic systems of small invariant mass and small azimuthal angle separation, which could contribute the above-mentioned deviations from the Standard Model. We propose a method to discover toponium in present and future data, and our results should pave the way to further experimental and phenomenological studies on toponium. Deeper understanding of the threshold behavior of the top pair production is necessary to accurately determine the top quark mass, which is one of the most important parameters of the SM.

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