Preprint Series in Particles and Cosmos Physics

nº IPARCOS-UCM-24-060

Ensuring that toponium is glued, not nailed

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November 2024

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www.ucm.es/iparcos/

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Abstract

Hints of toponium might be starting to appear in LHC data, as given the vast numbers of t quarks produced, enough survive on the exponential-decay tail long enough to fasten t anti-t together. I here discuss a few differences between the standard Quantum Chromodynamics (QCD) binding (the "glue'') and exotic short-range binding (the "nail'').
If the energy below threshold reaches the 3-4 GeV range (an LO calculation with alpha_s at the ultrasoft scale falls in that range) the peak of the eta_t is distinct enough that a cross-section dip should be apparent in the line shape, should there only be one isolated resonance, but is filled by the excited QCD states adding over a pbarn to the cross section of t anti-t production.
A new-physics short-range interaction, on the other hand, yields a larger cross-section for equal binding energy (or hardly a visible bound state for similar cross section). This is due to its larger t anti-t relative wavefunction at small distances.
Finally, assuming that standard QCD plays out, I comment on what size of constraints on new-physics coefficients one can expect at given precision.