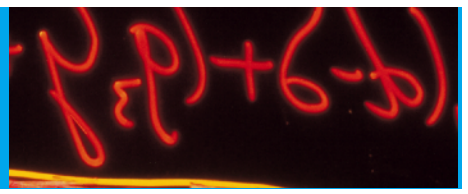
DESY
Quantum Universe Colloquium

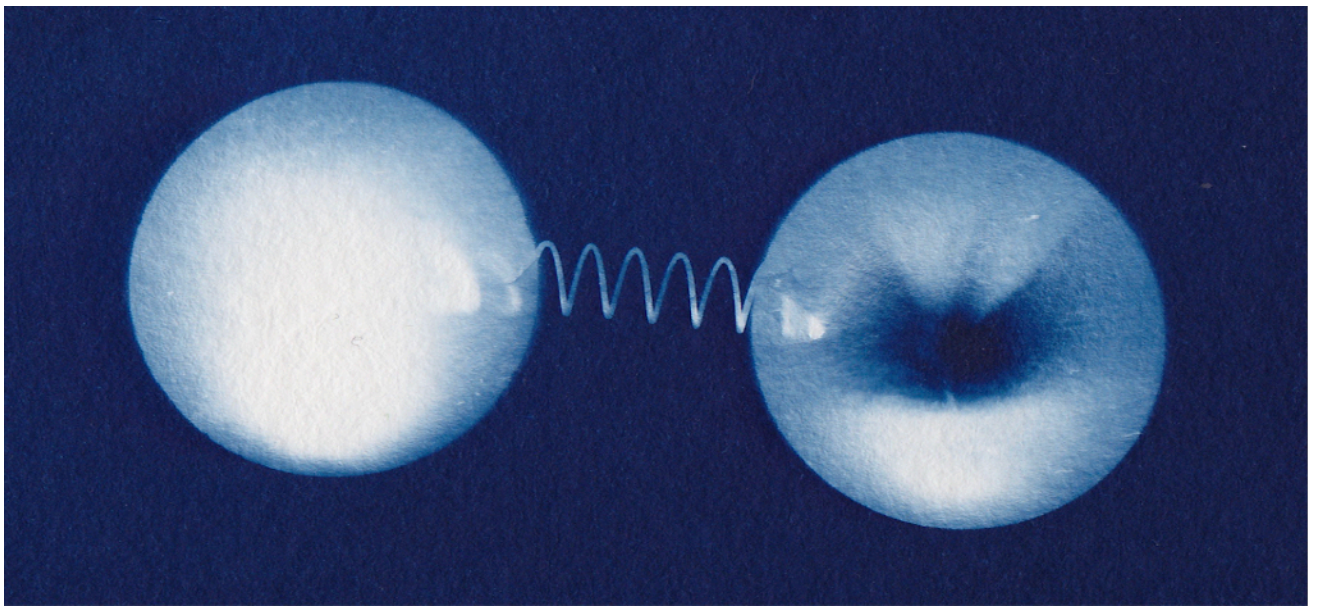


Observation of an excess at the top-quark-pair production threshold.

Tuesday, 15th July 2025
Auditorium & Webcast 16:00 h

ZOOM ID: 996 1652 8733
Meeting Password: 733220

Katharina Behr (DESY), Maria Vittoria Garzelli (Universität Hamburg), Alexander Grohsjean (Universität Hamburg)



An enhancement in top quark–antiquark ($t\bar{t}$) production near threshold was observed by the CMS Collaboration at the end of last year. A similar observation has now been reported by the ATLAS Collaboration, as highlighted in the CERN press release of July 8th. Both measurements focus on dileptonic $t\bar{t}$ final states and are based on the full Run 2 datasets in proton-proton collisions at $\sqrt{s}$=13 TeV. The observed enhancements are consistent with the formation of quasi-bound $t\bar{t}$ states, so-called toponium, as predicted by non-relativistic quantum chromodynamics. These results rely on state-of-the-art theoretical inputs and detailed systematic modeling, yet they also point to the need to improve the description of higher-order, off-shell, and bound-state effects. In this special colloquium, we will present the latest experimental findings from both the CMS and ATLAS experiments, and discuss progress of theory calculations, including future directions needed to sharpen our understanding of this threshold region.

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