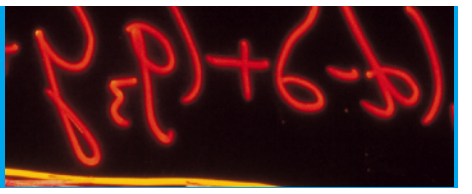
DESY
Particle and Astroparticle Physics Colloquium



Anomalies in Particle Physics.

Tuesday, 19 December, 2023
Auditorium & Webcast 16:00 h

Andreas Crivellin (PSI)

The currently accepted mathematical description of the fundamental constituents and interactions of matter is the Standard Model of particle physics. Its last missing particle, the famous Higgs boson, was observed at the LHC in 2012. However, it is clear that the Standard Model cannot be the ultimate theory of Nature, and e.g., cannot account for Dark Matter or non-vanishing neutrino masses (and does not include gravity). In fact, searches for physics beyond the SM have been intensified since the Higgs boson discovery. In this talk, I review the hints for new physics, called “anomalies”, obtained in particle physics experiments within the last years. We consider both direct high-energy searches for new resonances at the LHC and indirect low-energy precision experiments. These anomalies range from the nuclear scale (approximately the mass of the proton) to the electroweak scale (i.e. the mass of the Higgs boson) to the TeV scale (the highest scale directly accessible at the LHC), therefore spanning over four orders of magnitude. After discussing the experimental and theoretical status of the anomalies, we summarize possible explanations in terms of new particles and new interactions. In particular, new Higgs bosons and leptoquarks are promising candidates. Discovery prospects and implications for future colliders are discussed.

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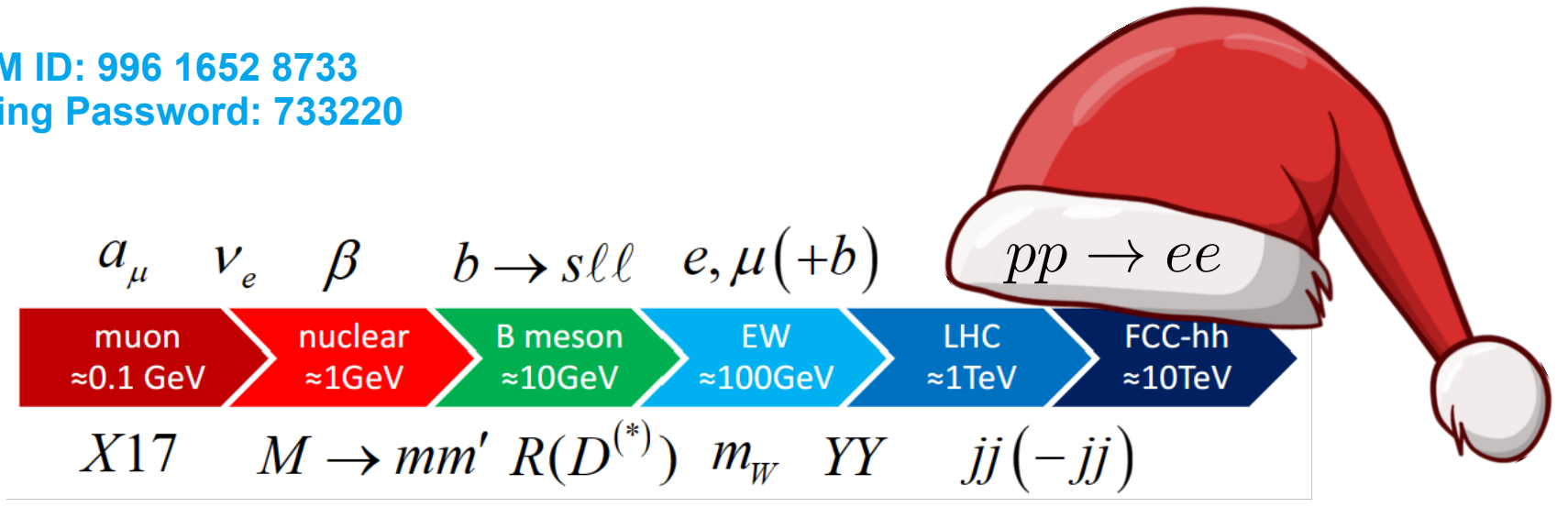

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