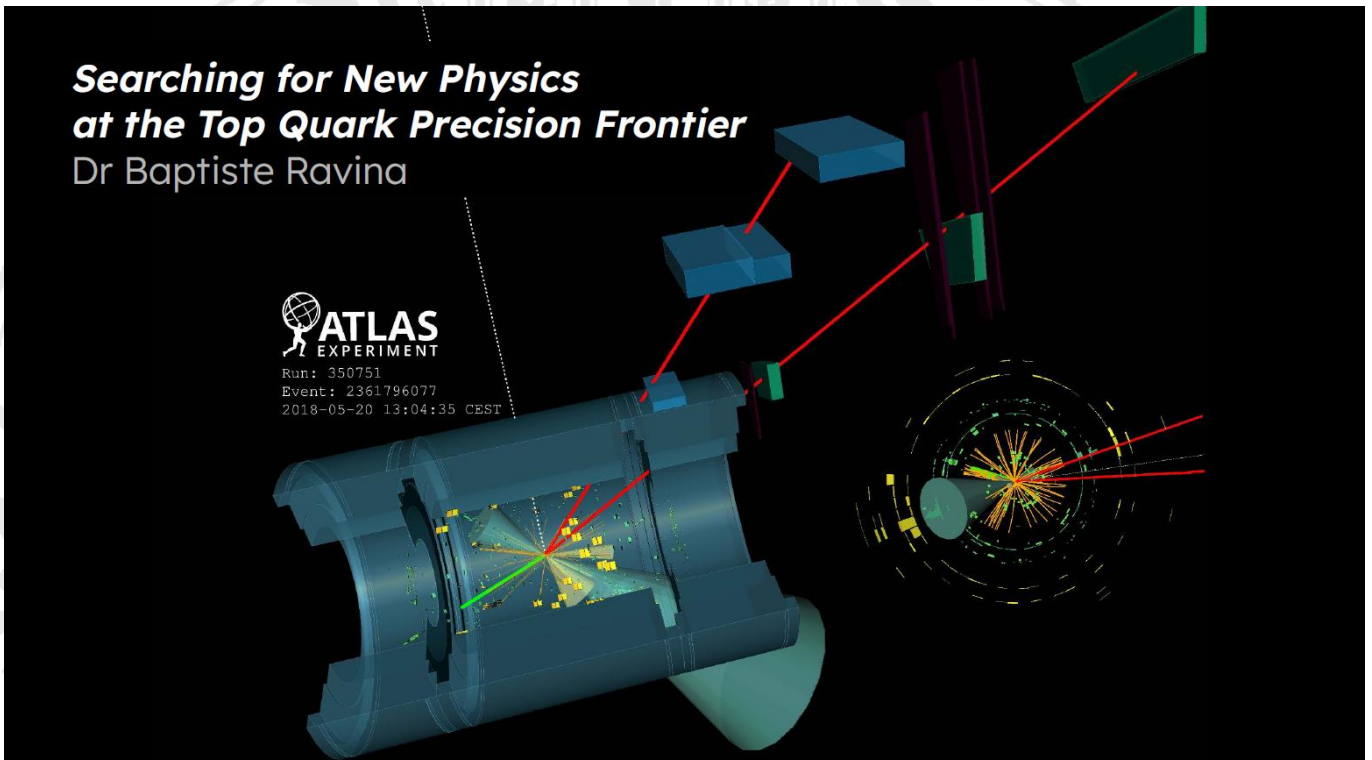


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AM 4. JULI 2024 UM 12:30 UHR
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Searching for New Physics at the Top Quark Precision Frontier

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The top quark is the most massive fundamental particle in the Standard Model, making it a prime candidate to connect with possible heavier exotic states. The study of its properties and production mechanisms are therefore highly relevant to the search programme of the ATLAS experiment. At the end of Run 2 of the LHC, the top quark pair production cross section is known to percent-level precision, and its mass to less than 2 per mille. In this overview of my research activities, I will show how we can use our knowledge of the top quark to look for direct production of Beyond the Standard Model particles, but also how precision measurements can be turned into powerful model-agnostic tools to search for new physics. I will briefly discuss the interplay with the development of state-of-the-art machine learning techniques that are affecting many aspects of our statistical analyses, before introducing a new subfield of high energy particle physics: quantum information at particle colliders. Nearly 30 years after its discovery, top quark physics is still an active area of research, with the upcoming High Luminosity runs of the LHC promising unprecedented opportunities for precision measurements and potential discoveries.