

Physikalisches Kolloquium

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Measuring intact protons at the LHC: From the odderon discovery to the search for axion-like particles

In the first part of the talk, we will describe the odderon discovery by the TOTEM and D0 experiments. The analysis compares the $p\bar{p}$ elastic cross section as measured by the D0 Collaboration at a center-of-mass energy of 1.96 TeV to that in pp collisions as measured by the TOTEM Collaboration at 2.76, 7, 8, and 13 TeV. The two data sets disagree at the 3.4 sigma level and thus provide evidence for the t-channel exchange of a colorless, C-odd gluonic compound, also known as the odderon. We combine these results with a TOTEM analysis of the same C-odd exchange based on the total cross section and the ratio of the real to imaginary parts of the forward elastic strong interaction scattering amplitude in pp scattering, leading to a combined significance larger than 5 sigma. In a second part of the talk, we will describe the perspective on the search for quartic anomalous couplings and axion-like particles using tagged protons in the final state, leading to sensitivities to beyond standard model physics that improve by 2 to 3 orders of magnitude on the coupling. We will finish by describing briefly the ultra fast silicon detectors for timing measurements as well as for medical and cosmic ray physics applications.

Monday, 21.06.2021, 16:15 Uhr

Ort: via zoom