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Searching for $H \to c\bar{c}$ in $t\bar{t}H$ production with the ATLAS detector — Diptaparna Biswas, Carolina Costa, Markus Cristinziani, Carmen Diez Pardos, Ivor Fleck, Gabriel Gomes, Jan Joachim Hahn, Nikolaos Kamaras, Vadim Kostyukhin, •Nils Benedikt Krengel, Austin Olson, Inês Pinto, Sebastian Rentschler, Elisabeth Schopf, Katharina Voss, Wolfgang Walkowiak, and Adam Warnerbring — Experimentelle Teilchenphysik, Center for Particle Physics Siegen, Universität Siegen

Since the discovery of the Higgs boson in 2012, its couplings to other particles have been investigated extensively by the LHC experiments as key tests of the Standard Model. Significant experimental effort is now directed toward measurements of the Yukawa couplings to second-generation fermions. The measurement of the charm-quark-Yukawa coupling with the ATLAS experiment is being expanded by an additional mode $t\bar{t}H(c\bar{c})$, in which a Higgs boson is produced in association with a top–antitop pair and decays into a charm–anticharm pair.

The experimental challenges of $t\bar{t}H(c\bar{c})$ lie in the efficient simultaneous identification of bottom and charm jets and the discrimination of signal from background processes. Especially in the all hadronic channel, the rejection of QCD multijet background is challenging, yet the addition of this channel, if feasible, can provide a significant boost to the sensitivity of the analysis. This presentation will showcase first investigations of the all-hadronic channel and how modern machine learning methods, such as transformers, can help overcome the experimental challenges.

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Email: krengel@hep.physik.uni-siegen.de