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Search for squarks and gluinos using machine learning in tau-rich final states using Run2 and Run 3 data from the ATLAS detector

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New physics has proven quite elusive, hence more data and increasingly sophisticated techniques are required to probe it. With Run 3 of the LHC started and major developments in modern machine learning techniques, we face a very interesting new era of experimental physics. We aim to quantify the gain in sensitivity by using the highly effective XGBoost framework in searches for supersymmetry by gluino and squark production with a tau-rich signature at the LHC using Run 2 and developing Run 3 data. This approach will be a reference of the relative gain in sensitivity by utilizing machine learning methods in comparison to traditional methods, while in addition being used to set competitive bounds on squark/gluino production and constrain the parameter space of new physics.

Author: HILLERSOY, Tarje Solberg (University of Bergen (NO))

Presenter: HILLERSOY, Tarje Solberg (University of Bergen (NO))

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