# Bachelor and Master Theses on Methods for Data Analysis

Working group of Prof. Dr. Markus Cristinziani

The ATLAS experiment at CERN, one of the largest experiments in elementary particle physics, has been constructed to explore the fundamental constituents and interactions realized in nature. To date the ATLAS detector at the Large Hardron Collider has collected more than 147 fb^{-1} of data, up to a center-of-mass energy of 13 TeV. The experimental particle physics group in Siegen is conducting analyses of several different decay channels, e.g. involving the top-quarks. In order to investigate various decay channels of interest advanced statistical methods for parameter estimation as well as multivariate methods (neural networks, boosted decision trees, …) and machine learning techniques are employed.

We invite interested bachelor and master students to join our group to work on thesis projects within the context of a large world-wide scientific collaboration.
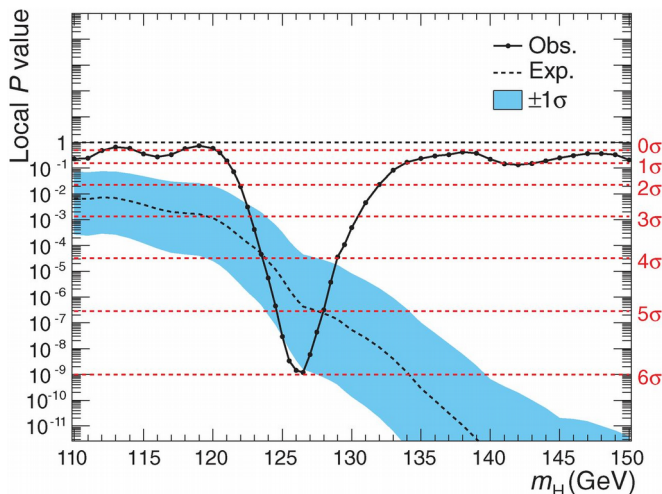
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Selection of possible topics:

- Separation of signal and background components in particle decays using parameter estimation techniques
- Extraction of the signal component in the decay $B^{\pm} \rightarrow J/\psi\, K^{\pm}$
- Investigation of the look-elsewhere effect in the search for an unknown particle using pseudo-experiments

Requirements:

- Good understanding of and curiosity for particle physics
- Interest in exploring experimental methods
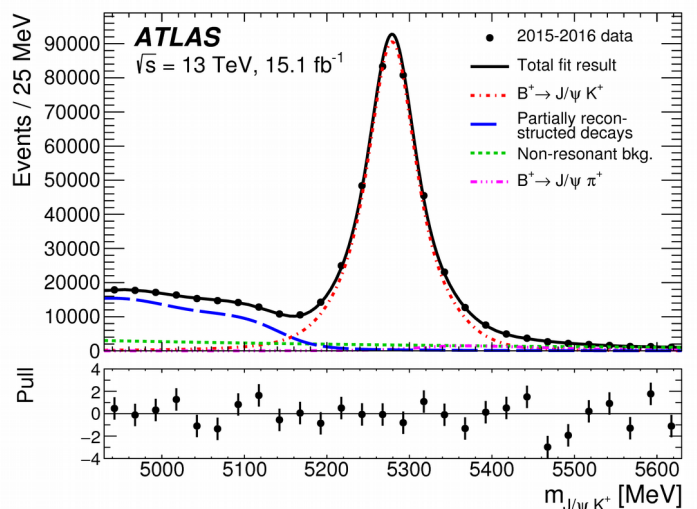- Interest in programming (C++, Python)

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