Contribution ID: **47** Type: **On-site planned, but remote also possible**

EM energy resolution studies with ATLAS detector

Many measurements performed by the ATLAS collaboration rely on an accurate understanding of the electron and photon energy response. The parametrization of the energy resolution is an fundamental piece that could be improved thanks to a special dataset collected by ATLAS during the Run 2 of the LHC.

Our current knowledge of the relative energy resolution, σ/E, is so far limited by our understanding of its energy dependence. This dependence has never been fully measured in-situ, and one of the terms (so-called sampling term), is determined from a combination of simulation and test-beam data.The imperfect knowledge of this terms is resulting in an additional 10% uncertainty on the parameterization of the energy resolution, that could be further constrained using ATLAS data taken in special conditions.

In standard LHC runs, the impact of energy deposition coming from additional proton collisions in the event is too important to make an extraction of the sampling term feasible. However, the ATLAS collaboration recorded an unique dataset of low pile-up events where the noise-term is expected to be negligible.

The aim of this project is to use this data to check the relative importance of the various terms of the electron energy resolution parametrization, and especially to study the sampling-term. This term has the most impact at low energy, hence it is possible to extract it from the $J/\psi \rightarrow ee$ mass distribution. Combining this result with similar measurements done in standard data taking conditions would allow a significant decrease of the uncertainty on the electron and photon energy resolution.

Field

B1: Particle physics analysis (software-oriented)

DESY Place

Hamburg

DESY Division

FH

DESY Group

ATLAS

Special Qualifications:

Basic programming skills necessary
Previous experience with data analysis desirable
Experience with Python and/or ROOT is required
Berlin/Paris Time Zone –> strongly preferred

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