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# AFB@FCCee: Current status and future plans

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## Current status

➤ Precise measurement of the forward-backward asymmetry of  $b\bar{b}$  in  $e^+e^- \rightarrow Z \rightarrow b\bar{b}$  events at FCCee.

○ **Two classes of methods for  $b$ -quark charge determination:**

**[1]** Jet charge in which charge of jet obtained as weighted sum of charges of constituent tracks [based on private MadGraph & Pythia & Delphes simulation].

**[2]** Lepton from semi-leptonic B decay in which the quark charges are tagged by the charges of electrons or muons [based on the central FCCAnalysis framework & different tools].

○ **Main features:** IDEA detector concept & ee-kt (**Durham**) jet clustering algorithm\* & exclusive process & exactly 2 jets (2  $b$ -tagged jets) & E recombination scheme &  $b$ -tagging efficiency for signal & mis-tag rate.

○ **Analysis strategy:** Build reco-level observable & perform unfolding & extract  $A_{FB}^b$  from fit to the unfolded distribution.

○ **Uncertainty estimations:** Statistical & Systematic uncertainties [QCD FSR (Parton Shower Models: Dire Showers), Flavour tagging efficiencies, clustering].

\*<https://indico.cern.ch/event/1173562/>

## Future plans

○ Implementing the jet charge study with the official [HEP-FCC/FCCAnalyses](#) framework.



○ Other sources of systematics.

○ Thinking about a general **Machine-Learning (ML) technique** for  $b$ -quark charge determination.

○ Have a detailed comparison with one/more of the LEP results.

○ To start the documentation of the AFB study.

○ Looking forward to the FCC week in London to present new results.



**THANK YOU  
FOR YOUR  
ATTENTION**