

Studies at LAL - Towards b-charge measurement

Motivation: b-charge measurement may lead to significant improvement of AFBt measurement and many other analyses based on bottom quarks

Reminder: In old days part of detector concept (Damerell et al.)

Basic consideration: 91% of the charges from top quark decays lead to signatures that are in principle measurable (details see last slide)

Take advantage of

- Theses by Jeremy Rouene and
- earlier communication with Taikan and Tomohiko
- Note that effort enjoys some funding by French-Japanese FJPPL-TYL programme (Not to forget of course collaboration with IFIC, about to create a triangle and in parallel to a network for work on top quark physics)

New LAL PhD student Sviatoslav Bilokin, started in Sept. 2014

- Up to now mainly work on tracking in SiEcal, with aim to extend to PFA algos in future
- Start with vertex studies about 1 month ago

First steps:

- Identify events with secondary at tertiary vertex using event record
- Verify efficiency of reconstructing these vertices
- Collect and analyse information coming along with these vertices (Collections in reconstruction and event record)
- Understand where information gets lost (if applicable) and get first ideas how to get back the information

We work on vertex in reco files i.e. **not** on DST

That;s where we are currently working on and we (=Sviatoslav) expect to show first results around the middle of January

Second step:

- Analyse b tagging algorithms
Remember that b-tagging tends to combine vertices and on DST one usually works on the Refinedxxx collections
=> This is another source where valuable information may get deteriorated as purpose of b tagging is not to reconstruct the charge
=> Other priorities may supersede proper charge reconstruction

B charge measurement - Potential

- b quark hadronises to about

~40% to charged B mesons

~50% to neutral B mesons

~10% to Baryons

=> 64% cases where there is at least one charged b => Should be recognisable

- neutral B mesons decay to about

~ 50% into charged D Mesons => measurable

~ 50% into neutral D mesons

~64% of these D neutral undergo prong decays => charged particles => measurable

=> Out of 36% cases remaining above ~75% can (in principle) be retrieved

=> 91% of the charges from top quark decays lead to signatures that are in principle measurable