

Brief overview of sw developed by Sviatoslav Bilokin



Roman Pöschl

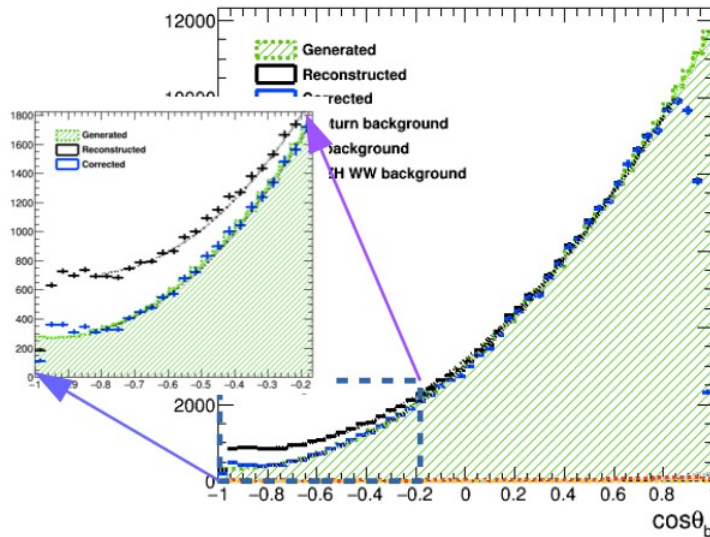


ILD Meeting 24/01/18

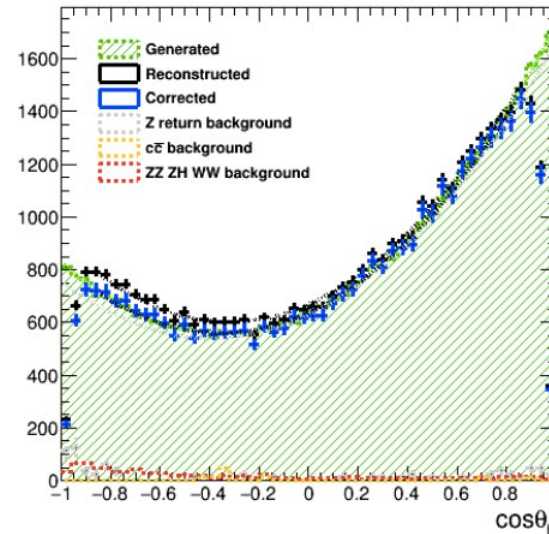
$$\sqrt{s} = 250 \text{ GeV} \quad \mathcal{L} = 250 \text{ fb}^{-1}$$

$$e_L^- e_R^+ \rightarrow b\bar{b}$$

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$$A_{fb}^{rec} / A_{fb}^{gen} = 100.7\% \pm 0.62\%$$



$$A_{fb}^{rec} / A_{fb}^{gen} = 104.9\% \pm 2.25\%$$

- Analysis makes essentially use of vertex charge based on Jets and particle ID

1) The following is the result of an e-mail conversation I have with Sviatoslav and from reading and (partial) running of the code that he made available to me

Sviatoslav is now working at full steam for Belle II and therefore the conversation takes its time

2) His analysis used the ilcsoft version v01-17-11

3) This talk is meant to take stock of tools before they got forgotten and thus to assure the preservation and sharing of knowledge to ILD

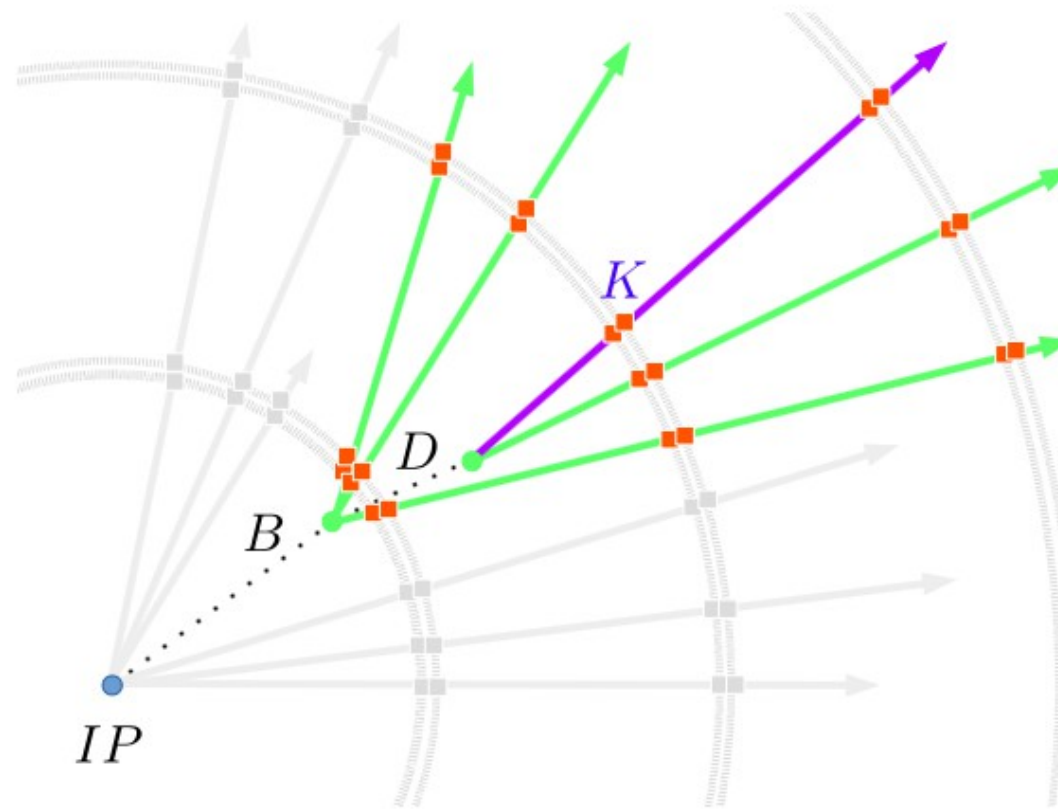
4) I will continue (**as time permits**) to trace the nuts and bolts of the software

5) The best way is to resume the analysis at the point where Sviatoslav stopped and embedding all tools into ilcsoft (taking into account the latest developments)

6) The code is applicable for $ee \rightarrow bb$ and semi-leptonic $ee \rightarrow tt$
The portation to $ee \rightarrow tt$ has started

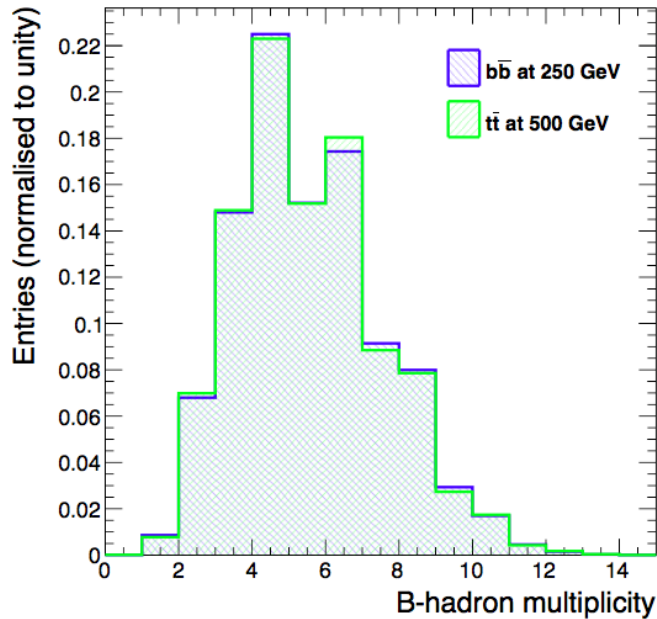
7) I have the links to the sources but I was hesitating to make them public today without explicit permission by Sviatoslav

Credits: Sviatoslav benefited from the earlier work by Sohail Amjad, Jeremy Rouene and Philippe Doublet
He also benefited from a research stay in Japan in 2016

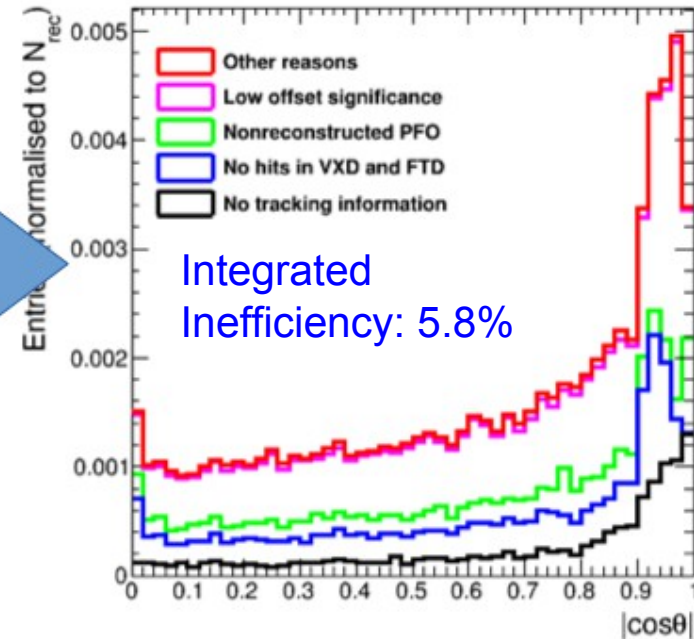
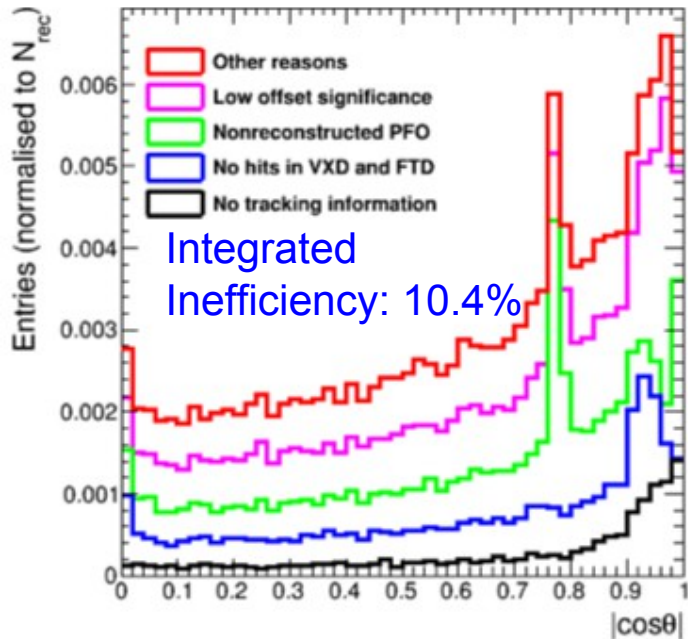


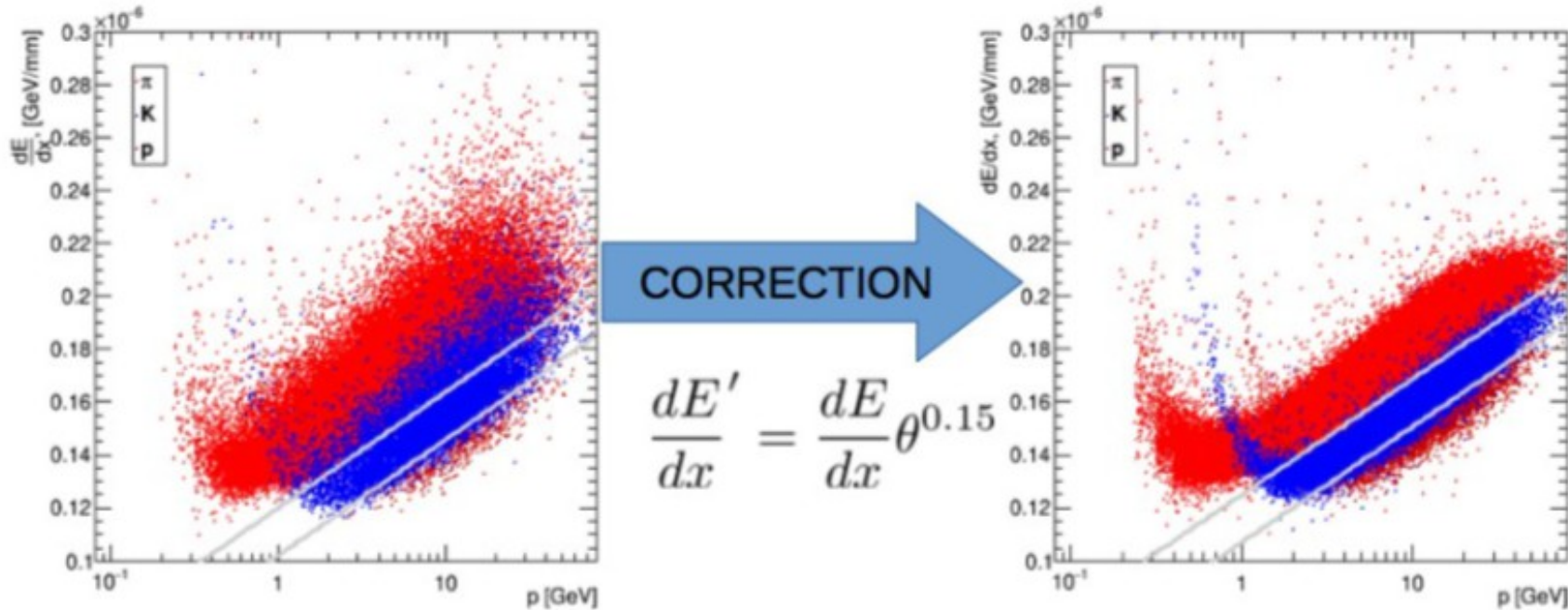
- **b-quark charge measurement**
 - Important for top quark studies, indispensable for $ee \rightarrow bb$
- **Control of migrations:**
 - Correct measurement of vertex charge
 - Kaon identification by dE/dx

Both options accessible with ILD



- Recovery by VertexRecovery Processor
- Comparison with MC Truth by TruthVertexFinder
- Both are part of ilcsoft (!) but no known user
- However not at latest version, available at Sviat's private github
-> Can be made available on request





- KaonID and correction available in Sviatoslav's github
Can be made available on request
- However, at least in previous DST files dE/dx was **not** available and the value was fetched from the reconstructed sample
(Honestly I could not figure out so far how exactly)
- Maybe a non issue in current ilcsoft versions (Thanks to Masakazu)
Propose however cross-check against Sviatoslav's tools (where possible)

- A missing jet class was found to be inconvenient
Jet class could inherit from ReconstructedParticle
- This class should provide easy access to e.g. ctag/btag values
Has to be retrieved so far from LCRelations (through parameters from reconstructed vertices)

Citation from Sviatoslav's mail

“The implementation of the RecoJet class is here:

Code [link available](#)
Header [link available](#)

I wrote the class just to simplify the analysis, the real RecoJet class should have a proper inheritance structure and encapsulated setter/getter methods. I don't think every helper method should be implemented, some might be useful for others.”

Opinion R.P.: At least there should be standard utility methods that do the navigation through the LCRelationClass

-> Will check once more the argumentation of Sviatoslav but I think he has a point

- Started/continued to understand the details of Sviatoslav's analysis
- Fulfilled therefore a promise made at a conveners meeting to collect information on these tools and to identify “wishes” that arose from the experience
- Desirable to progressively include the knowledge into ilcsoft

Some parts are already in ilcsoft but require maintenance (and users)

Private code may serve as inspiration

Will cross check with Sviatoslav whether one can have access to his private github

- Will continue to scan through the code
- Hopefully some more progress at ILD Meeting in Ichinoseki (or s/w Meeting at KEK)