DIS electron identification

(selected topics)

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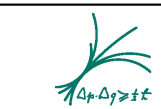

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Parton Showers for Future e^+e^- collides, CERN, Geneva, 24th of April 2023

DIS electron in (a) detector

Any electron momenta are measured in tracking and in calorimeter.

Great if:

- the e track matches the calorimeter deposit in position and energy.
- the calorimeter deposit has no physical noise around – e.g. γ/π^0.
- the tracking is done with electron mass hypothesis (typically with π)
- the dE/dx gives a good clue for $e$vsπ.

Solveable with a better detector.

But:

- How to select **the** DIS electron when there are multiple candidates? **Essentially check the hadronic final state kinematics is consistent with the kinematics of each electron, i.e. combine multiple measurements [1].**
- How to associate the semi-hard radiation from the electron with the electron? **Try to cluster** *some* **energy from the calorimeter deposits with the electron. Cluster the photons from the interaction point if they are angularly close to the electron?**

Not fully solveable

DIS electron in (a) true MC event record

One should follow a clear rule: look only at the final state.. Approach pushed hard by e.g. Rivet [2]/MCNET authors

- How to associate the semi-hard radiation from the electron with the electron? **Looking only at the final state.**
- Each electron is a potential candidate for DIS electron. How to select the proper one? **In case of one electron anything will work. In case of multiple electrons even a simple rule, such as take electon with "maximal" energy/p_z/etc. will work for 50+% cases if only 2 electrons are present. Basically implemented in Rivet.**

Step beyond: combine information from the hadronic final state with the electon to resolve the ambiguity and outperform the default Rivet algorithm [3].

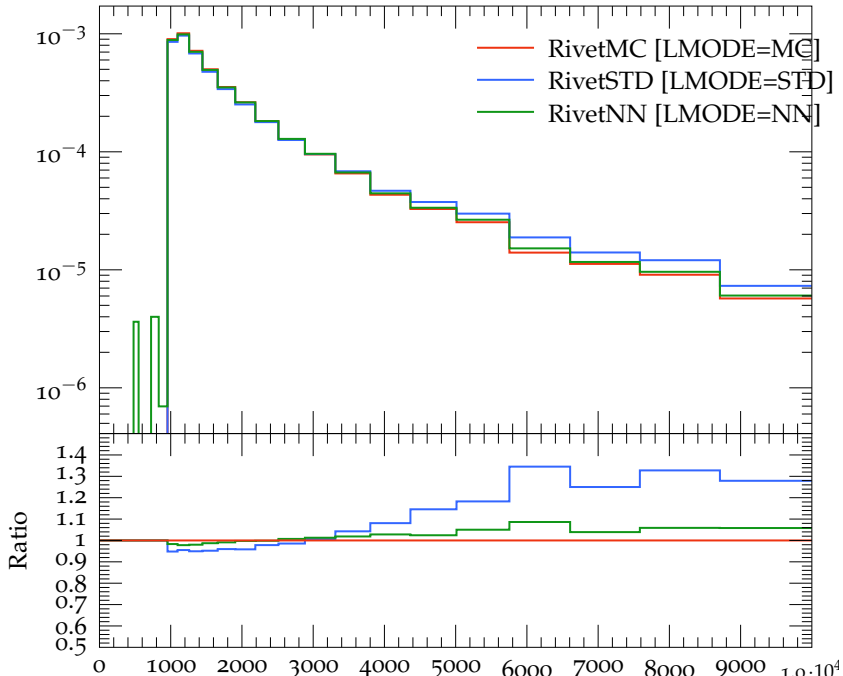

Figure: the true Q^2 from the full MC event record, the standard Rivet algorithm from the final state (STD) and the NN algorithm from the final state. The cases fro multiple electrons.

Bibliography I

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