

Problem with PT in events with Weizsäcker-Williams virtual photons

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Introduction

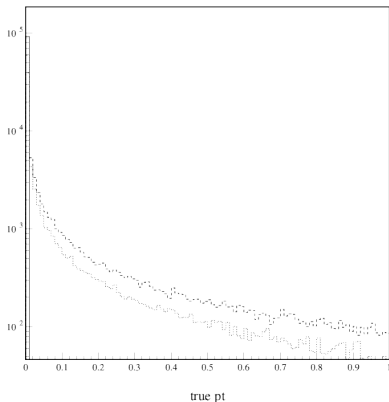
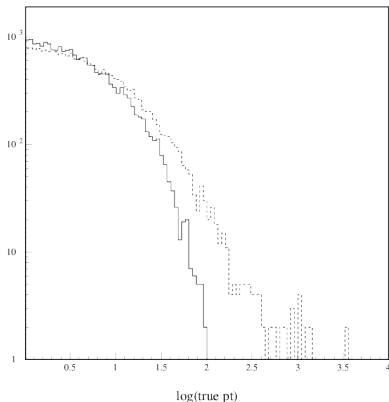
- In processes with in-coming photons, the photons might be
 - **Real**, from back-scattered beam-beam induced synchrotron γ :s. Identified by the beam-polarisation designated as “B”.
 - **Virtual** (Weizsäcker-Williams) γ :s radiated from either in-coming beam. Identified by the beam-polarisation designated as “W”.
- Such processes have names starting with “aa_...”, “ae_...”, or “ea_...”.
- Eg.
E0500-TDR_ws.Paa_II.Gwhizard-1.95.eB.pW.I37479.01.stdhep is $\gamma^* \gamma \rightarrow ll$ at 500 GeV, with the γ on the electron-side being a real beam one, the one on the positron-side a virtual one.

Introduction

- In principle, there could be **additional ISR** from the incoming electron in the Weizsäcker-Williams case, but for technical reasons **Whizard can't make these**.
- In the DBD-production, a “ **p_T -kick**” was added to such events.
- However, no check was done to make sure that the would-be ISR was invisible (down the beam-pipe), nor that energy was conserved!
- Hence, there are events in these classes with **very large** missing p_T .

The problem: true p_T

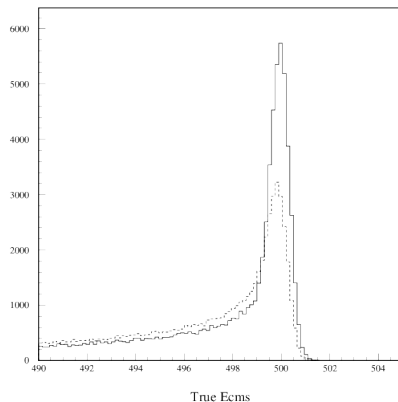
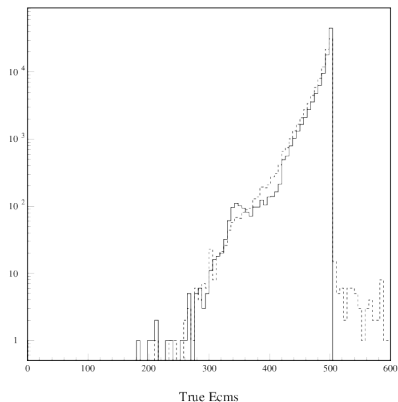
p_T of the MC-truth sum of all stable, final-state particles:



Left: Solid=B+W, dashed=W+W. Right: Solid=Normal 2f (all in first bin), dashed=W+W, dotted=B+W.

The problem: true energy

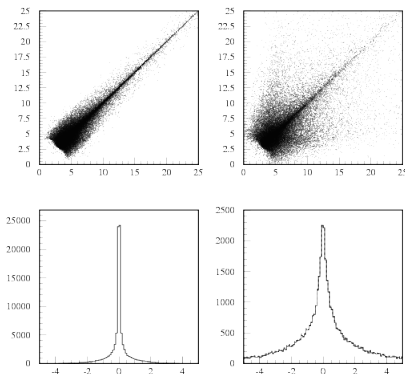
Energy of the MC-truth sum of all stable, final-state particles:



Left and right: Solid=Normal 2f, dashed=aa_2f.

The problem: seeable p_T -miss

p_T of one μ vs. that of the other in $\gamma\gamma \rightarrow \mu\mu$ events (top), and the difference between them (bottom).



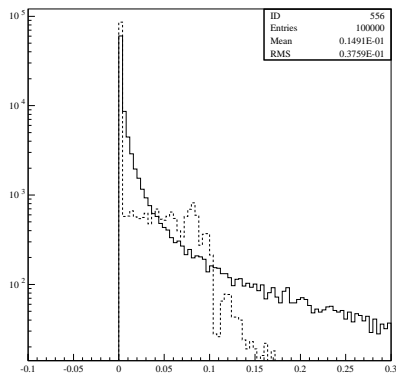
Left is LOI (no “ p_T -kick”), right is DBD (with “ p_T -kick”).

Outlook

- Need to **remove** such events.
SiD demand $p_T(\text{true}) < 5 \text{ GeV}$.
- Better to cut on “**de-boosted**”
 $p_T(\text{true})$ (ie. in head-on system).
- A cut a 200 MeV seems reasonable in this case.
- **Correct weight in this case needs to be evaluated, and possible bias.**
- Marlin processor to come ...

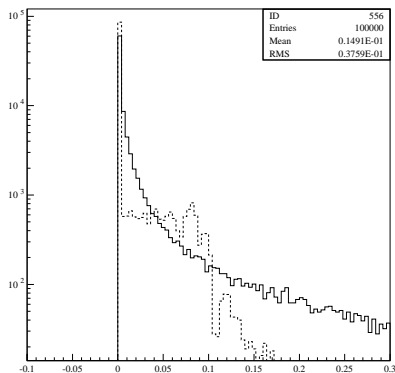
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