

Generator vs. detector level studies for the X of the Decay $B \rightarrow X_{\tau\nu_{\tau}}$

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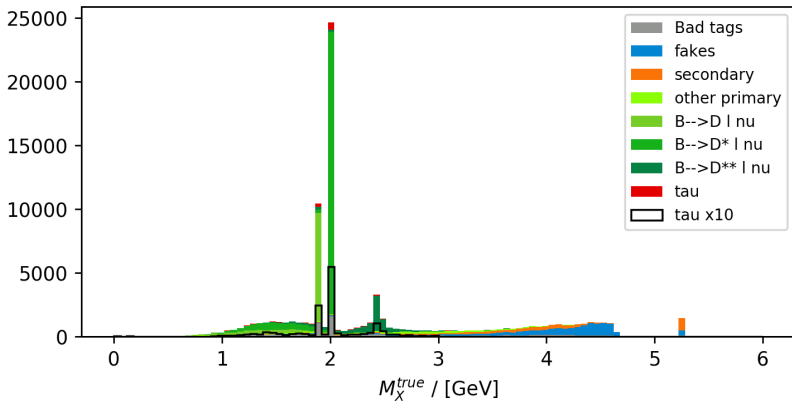
June 30, 2020

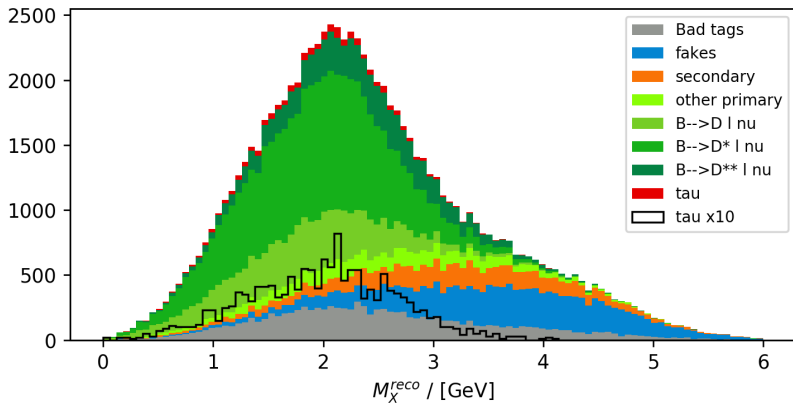
The Rest of Event

- X described with the ROE
- Includes all not yet reconstructed Particles in Event
- ROE uses list of particle list to determine the PID.
- The order of Lists are: K^+ , p, e^+ , μ^+ , π^+ , γ , (K_L^0)
- The first list with the Particle candidate determines the PID

How to get the X at Generation Level

- 1 Reconstruction of B-tag (FEI) and the candidate lepton.
- 2 Make a **List** of all Final State Particles at Generator level with a relation to the reconstructed Particles.
- 3 Remove all Generator Particles related to the Tag-B and the lepton candidate.
- 4 Use resulting **List** to calculate the Mass



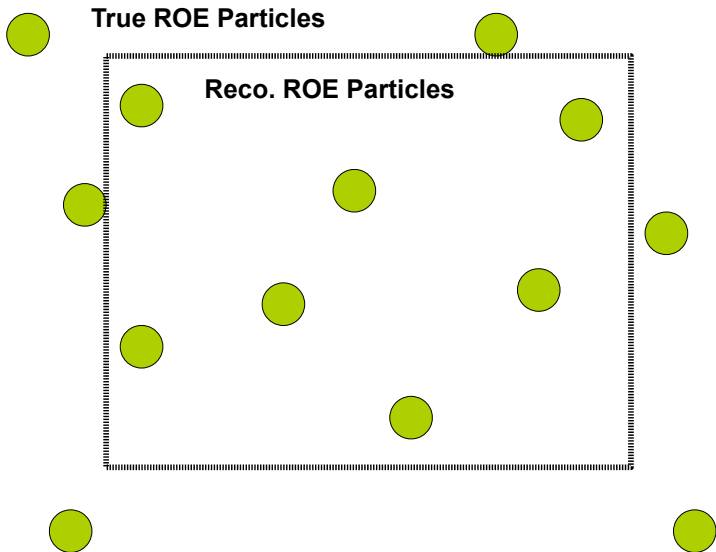


Error sources

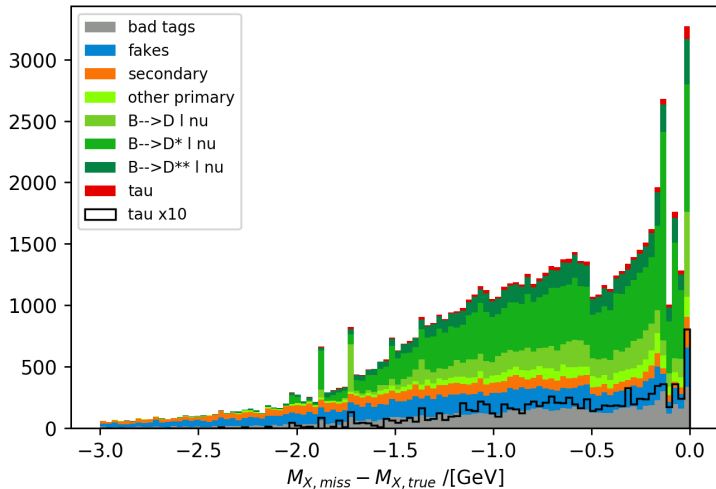
- Missing Particles
- Beam Background/Material interaction
- Clone Particles
- Misidentified Particles
- Particles from Tag-side

Due to overlap a separation between different error sources is necessary.

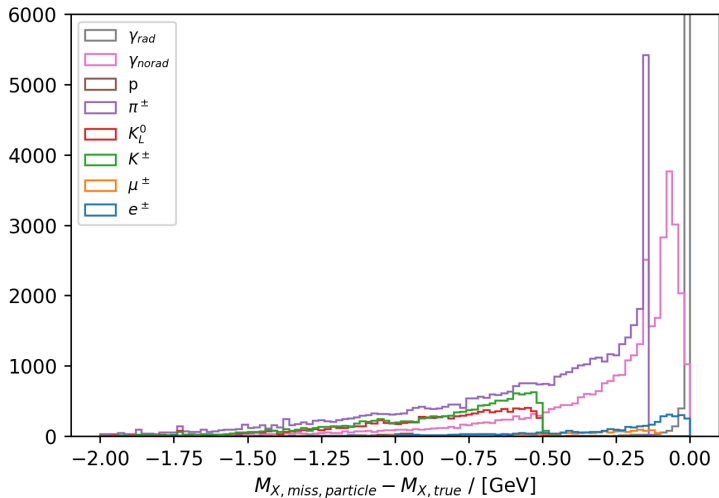
Missing Particles



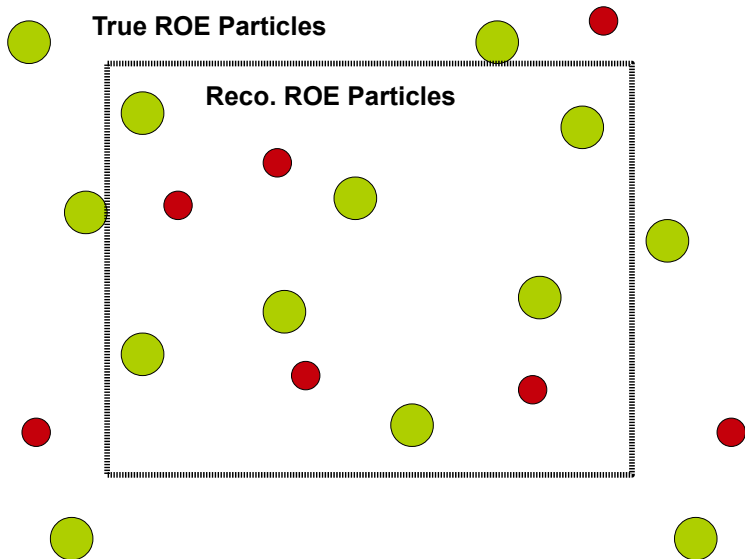
Missing Particles



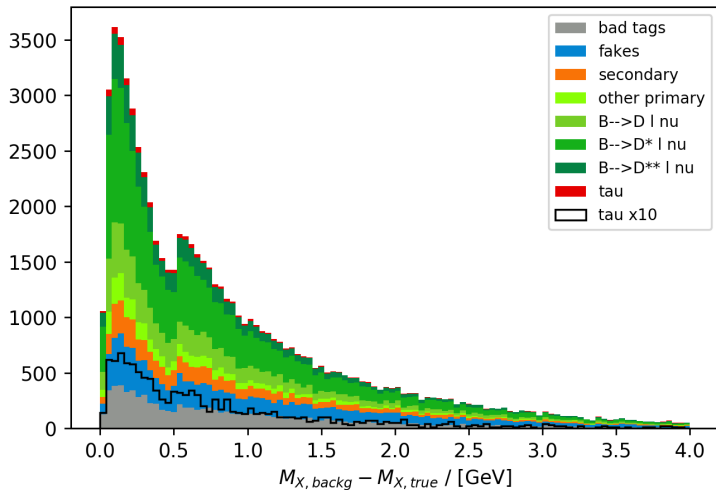
Missing Particles



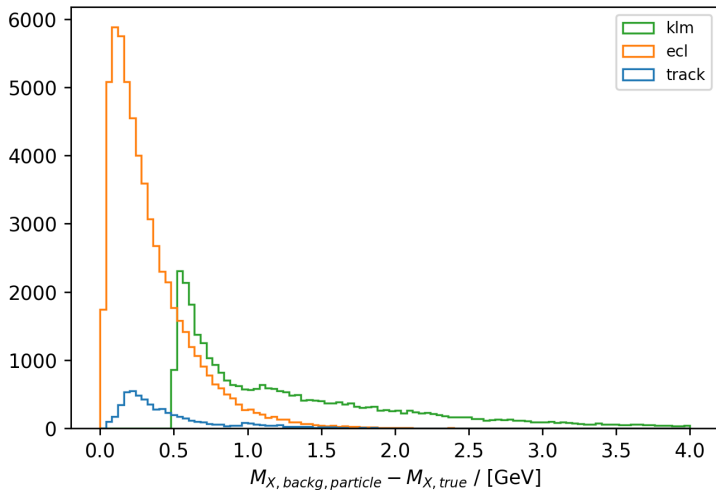
Beam Background/Material interaction



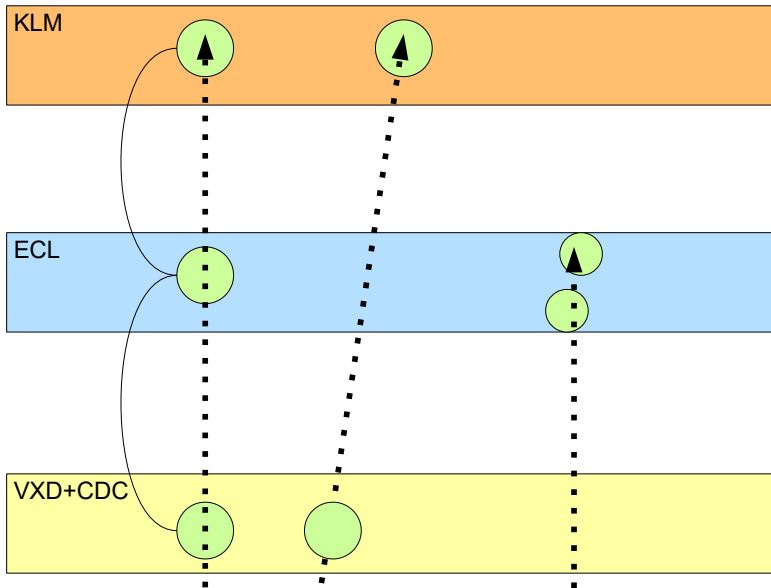
Beam Background/Material interaction



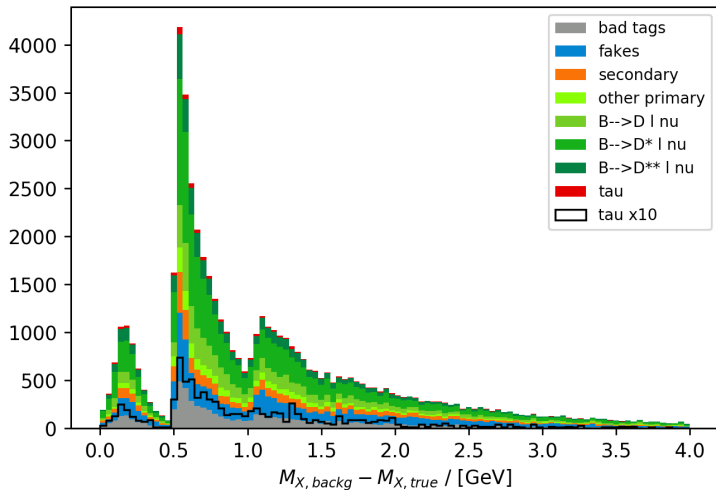
Beam Background/Material interaction



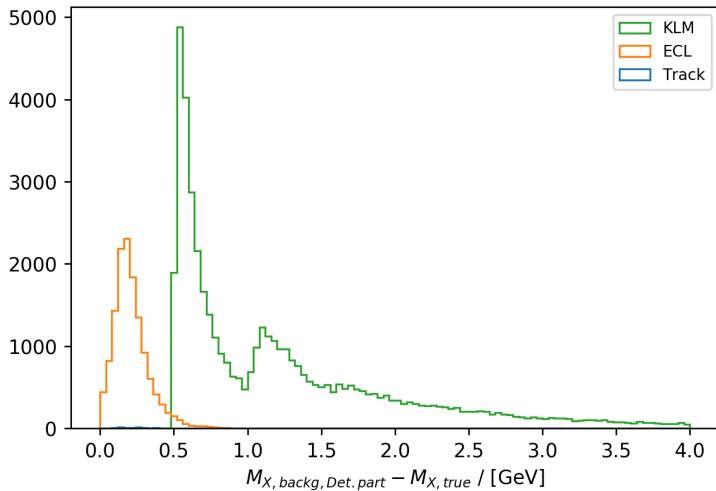
Clone Particles



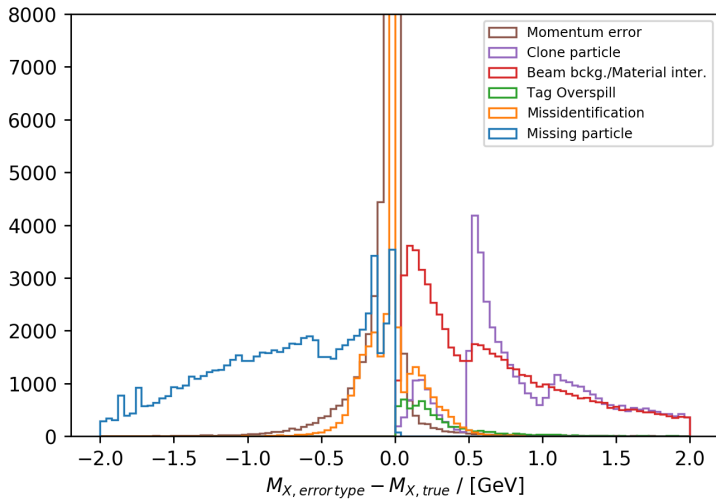
Clone Particles



Clone Particles



Different Mass Errors

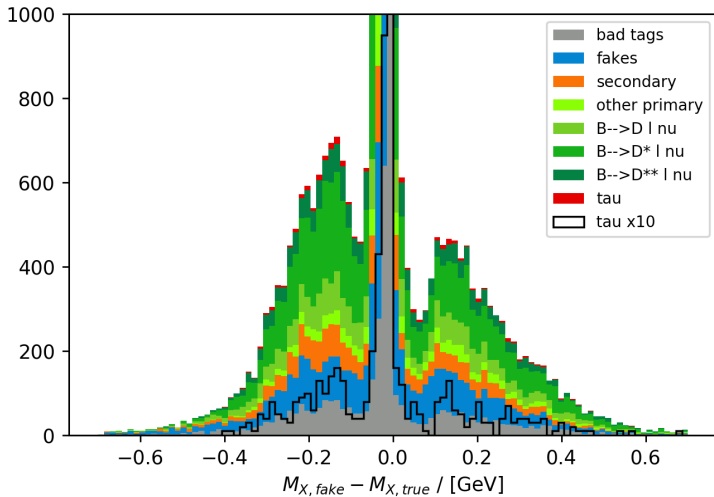


Outlook of the Master thesis

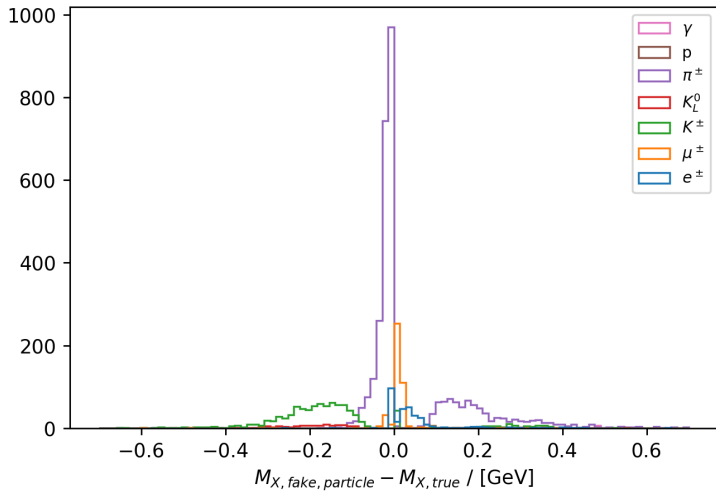
- ✓ Search and analyse error sources in the the invariant Mass of the X
- × Reject more beam background and Material interaction.
- × Include Particles that are still missing in the ROE.
- × Exclude Particles that were found more than once.
- × Use KinFitter from BARBAR to calculate the Mass of the X

END

Miss identification



Miss identification



Tag-side Particles

ROE Mass diff. MC Momentum

