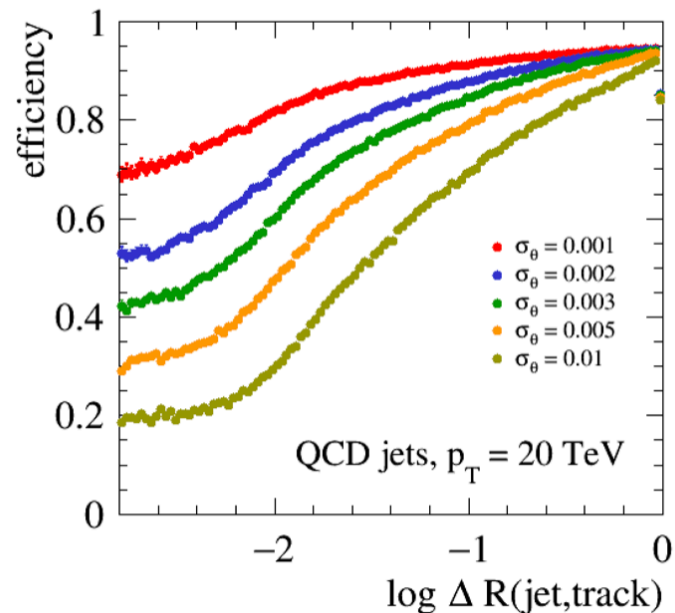# Delphes cards variations

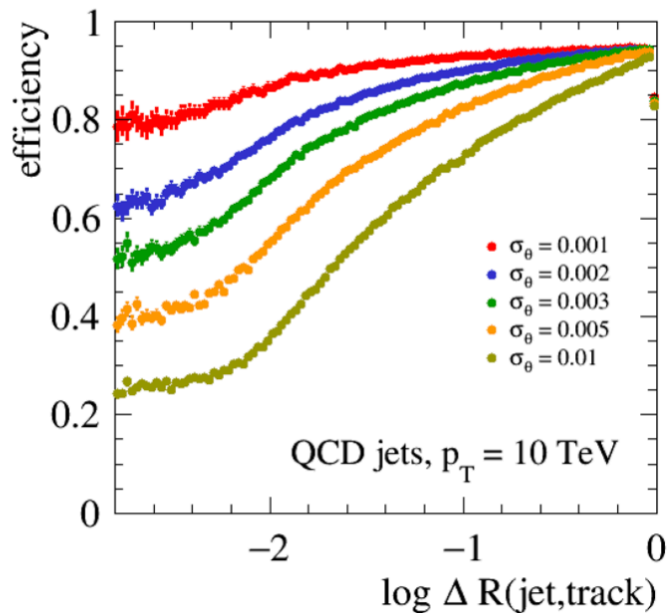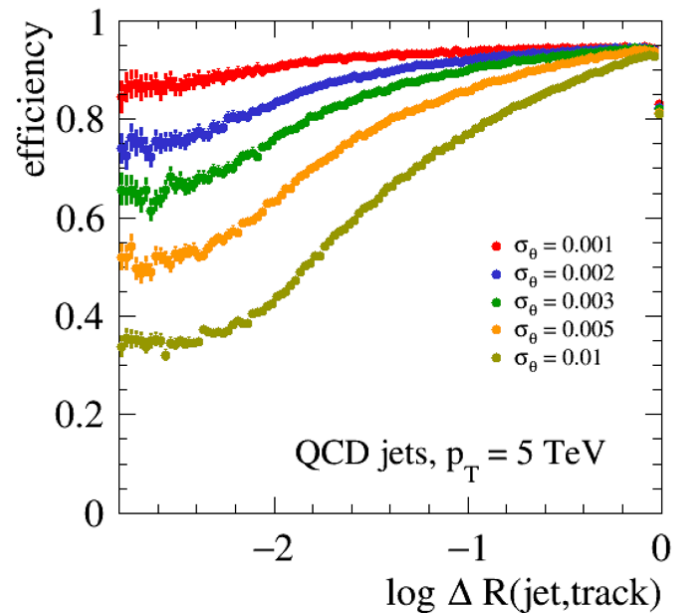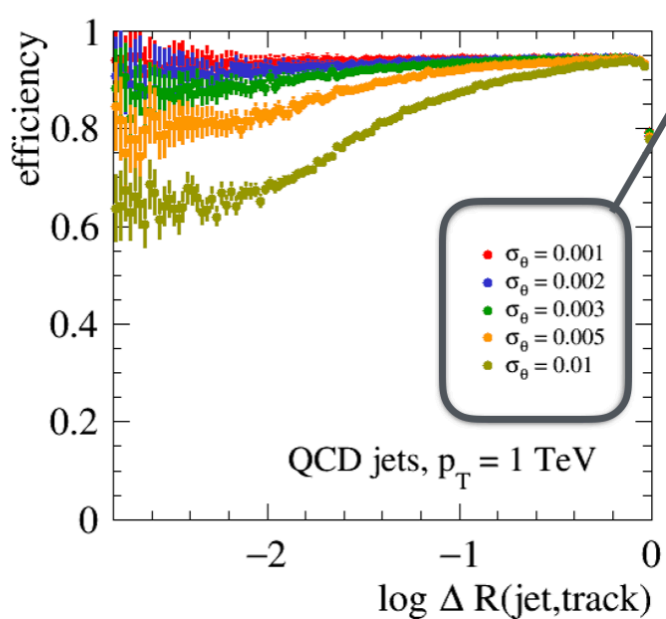Clement Helsens, Michele Selvaggi

Introduction

- As done for the ATLAS upgrade the idea would be to compare the nominal FCC Delphes parametrisation with a better and worse detector

- This will be very informative in terms of physics reach, so that the different variations brackets the nominal

- We will also present results using the CMS parametrisation

- Those variations and the CMS one will be centrally supported, this does not prevent users to study more configurations if they want to

Track angular resolution

- Up to now in Delphes the track angular resolution is considered as perfect

- This is a wrong assumption and it has been implemented in a new Delphes release (not yet propagated in FCCSW)

- CMS value is consistent with $\sigma\theta \sim 0.003$

- Propose to choose 0.003 or even 0.002 as a conservative baseline

- back of the envelop calculation with Zbynek
  - showed that if we consider a track as merged if the 1st pixel layer is shared, lead to a $\sigma\theta \sim 0.004$-0.006
  - We should be able to distinguish 2 overlapping tracks even if they share the first 1-2-3 pixel layers?
  - So the proposed number does not look completely crazy

- Of course a full simulation of the FCC tracker to study this track resolution would be more than welcome to validate the choice!

Instrinsic tracking angular resolution

QCD jets, p_T = 1 TeV

Legend:
- σ_θ = 0.001
- σ_θ = 0.002
- σ_θ = 0.003
- σ_θ = 0.005
- σ_θ = 0.01

QCD jets, p_T = 5 TeV

QCD jets, p_T = 10 TeV

QCD jets, p_T = 20 TeV

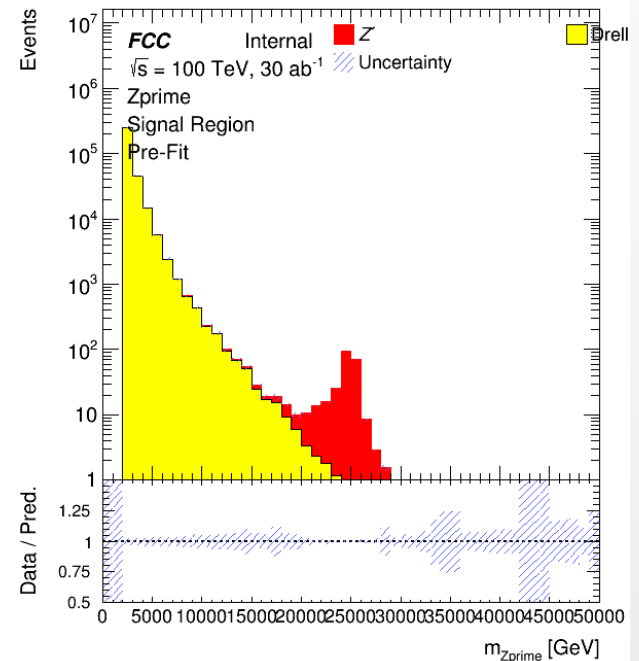Axis labels: efficiency vs log Δ R(jet,track)

Proposed variations

- All resolutions: x2, nominal, x0.5
- Tracking/ECAL/HCAL granularities: x2, nominal, x0.5

- Charged hadron efficiency: 90, 95, 99%
- Muon efficiency 95, 99, 100%
- Electron efficiency 90, 95, 99%
- Photon efficiency 85, 95, 100%

- B-tag efficiency (constant fake-rate): 75, 85, 95%
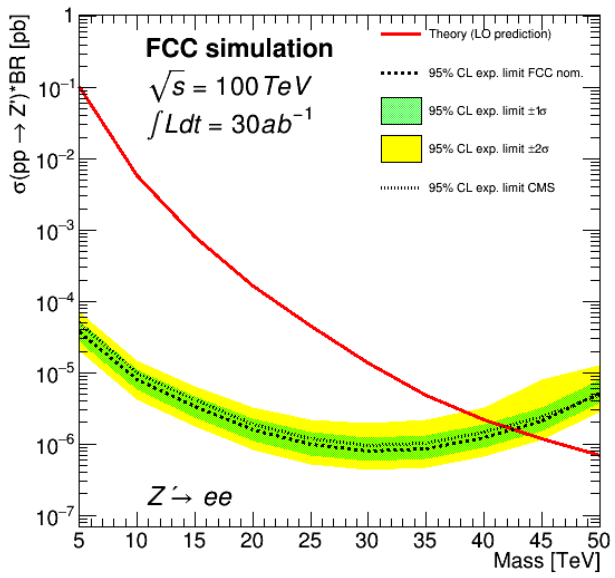- C-tag efficiency (constant fake-rate): 35, 45, 55%

Z'->ll

- Following the previous discussion, and to make progress for the report re-did the discovery potential of FCC (nominal only) and CMS for Z'->ll (significance for 5sigma discovery ongoing)

- Selection
    - 2 same flavor lepton, p_T>200GeV, M_{ll}>2TeV
    - Use full M_{ll} shape as discriminant
    - Asymptotic limits
    - 50% uncertainty on Drell-Yann
    - 30ab^{-1} luminosity

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Z'->ll