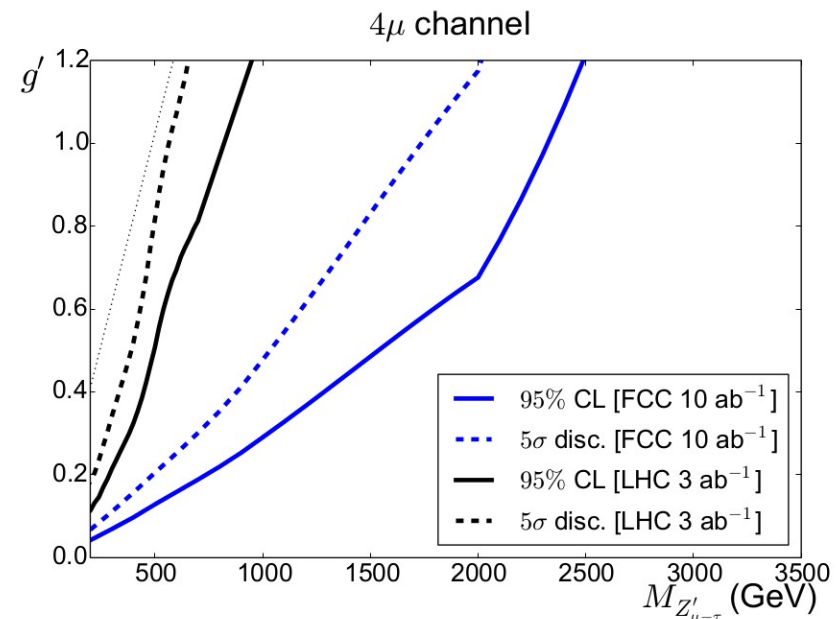
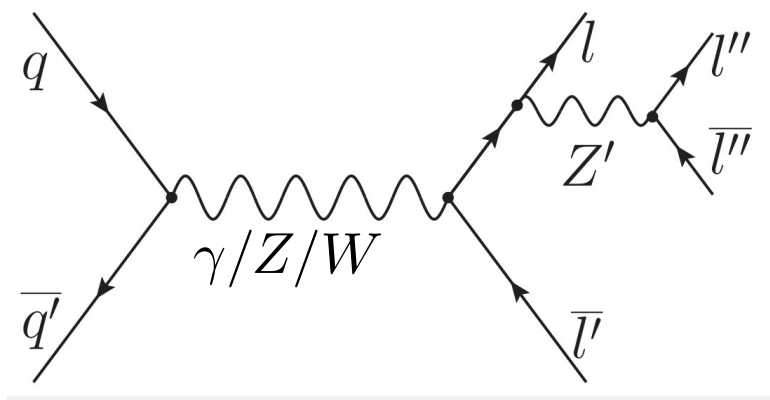


Dilepton resonances in 4-lepton final states

- Leptophilic interactions (couplings only to leptons) at hadron colliders: four-lepton final states (small cross sections)
- Big gain from larger CME



Dilepton resonances in 4-lepton final states

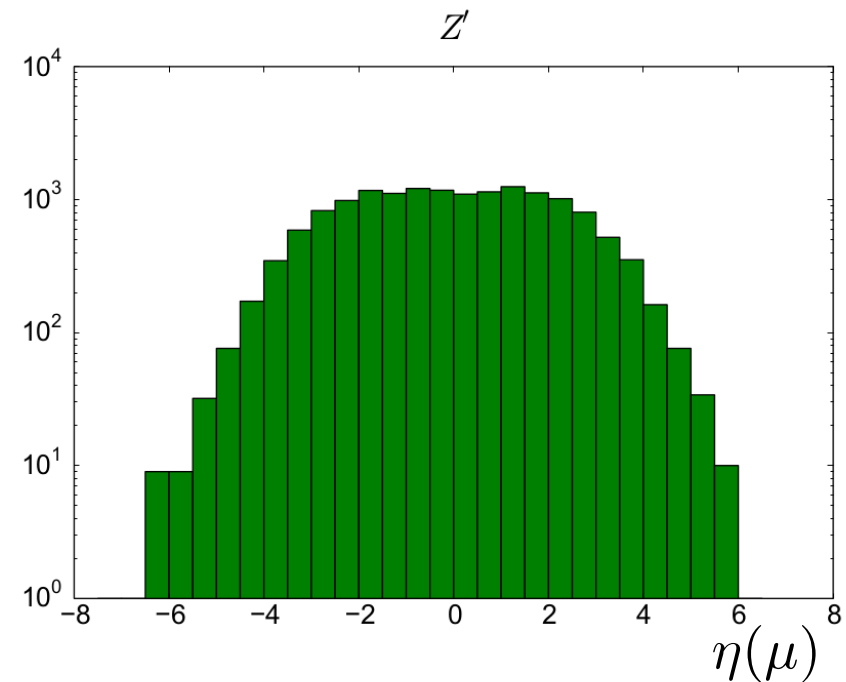
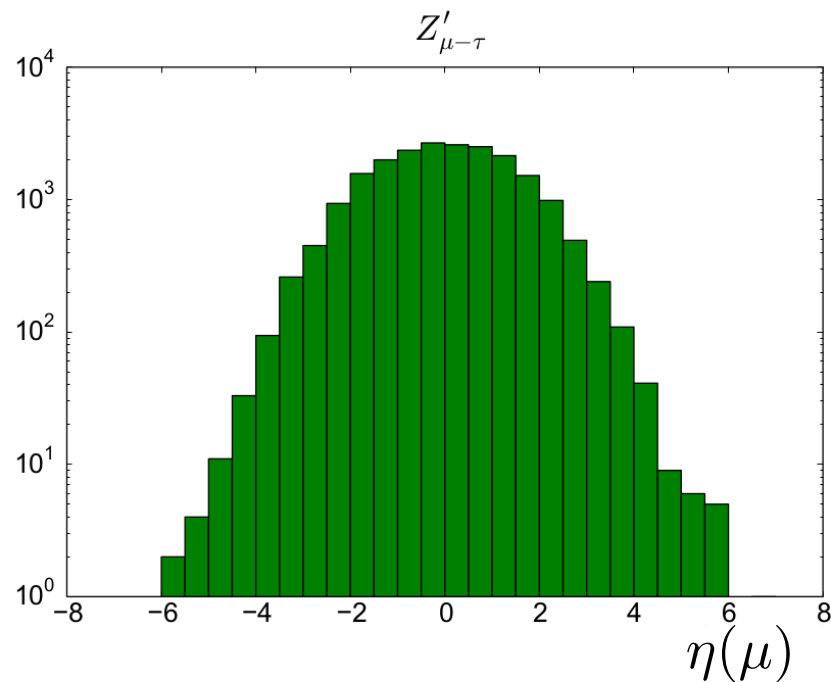
- Leptophilic interactions (couplings only to leptons) at hadron colliders: four-lepton final states (small cross sections)
- Big gain from larger CME
- Benchmark model: $Z'_{\mu-\tau}$
 - Can be relevant for observed anomalies
 - Typical example of model difficult to see at LHC despite relatively light masses
 - Could present characteristic kinematic features

Dilepton resonances in 4-lepton final states


- Why relevant for THIS meeting? It's not identical to other dimuon resonances
 - Comparison between different sources of $\mu^+\mu^-$ resonances in four (and two) μ samples:
 - $Z'_{\mu-\tau}$
 - SM ZZ production
 - Z' with small (large) couplings to q (μ)
 - Benchmark values:
 $M_{Z'} = 2 \text{ TeV} \quad g' = 1 \quad (\Gamma_{Z'} = 160 \text{ GeV})$
keep $\mu^+\mu^-$ with $|m_{\mu^+\mu^-} - M_{Z'}| \leq 200 \text{ GeV}$

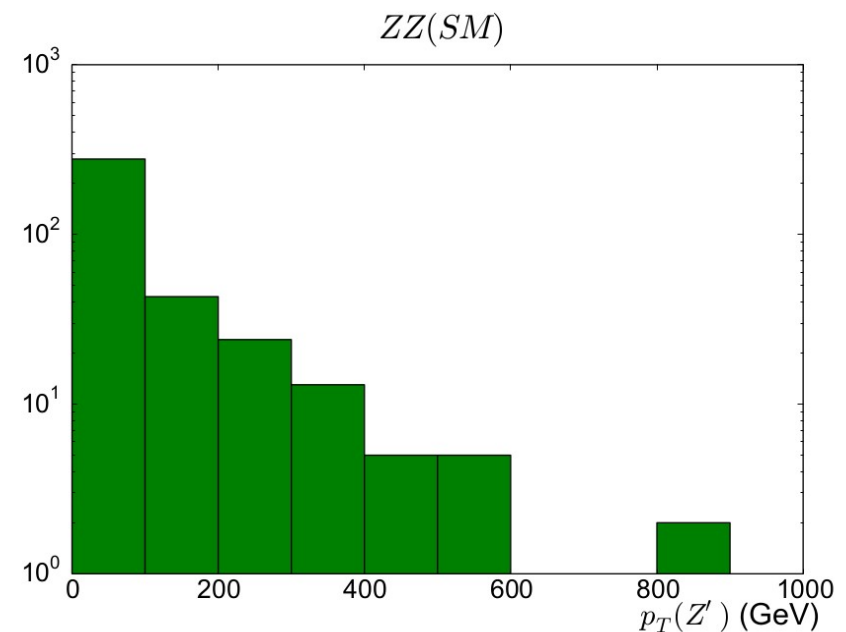
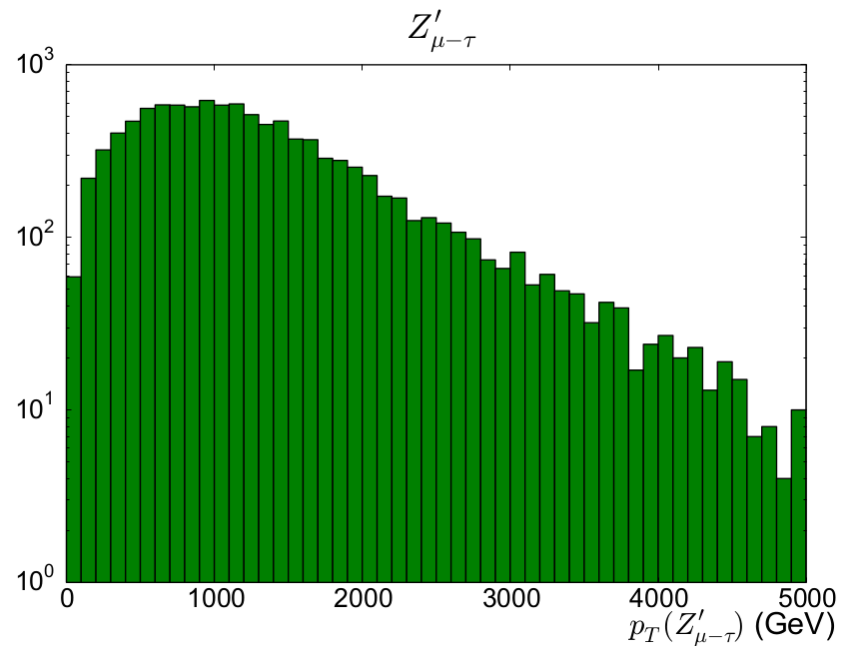
Dilepton resonances in 4-lepton final states

- Why relevant for THIS meeting? It's not identical to other dimuon resonances
 - Many distributions are similar (rapidity of muons at the peak)



Dilepton resonances in 4-lepton final states

- Why relevant for THIS meeting? It's not identical to other dimuon resonances
 - But not all: Z' tends to align with parent lepton 
large $p_T(Z')$

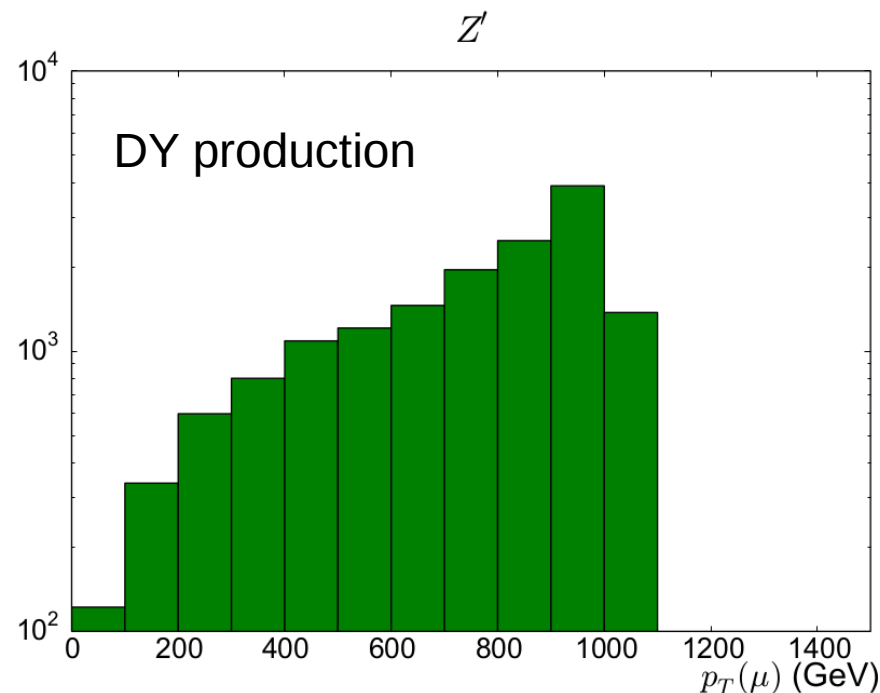
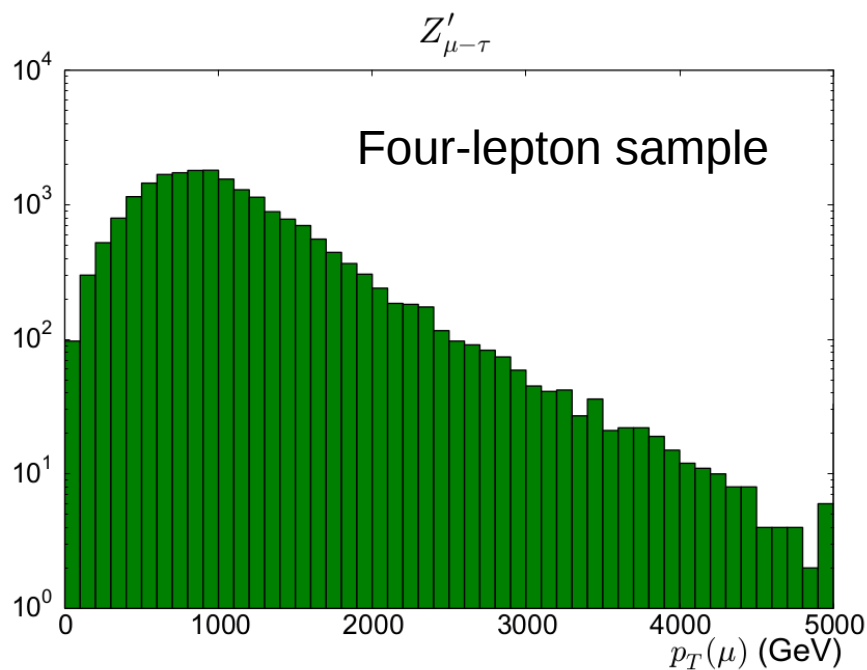


Dilepton resonances in 4-lepton final states

- This propagates to $p_T(\mu)$

$$M_{Z'} = 2 \text{ TeV} \quad g' = 1 \quad (\Gamma_{Z'} = 160 \text{ GeV})$$

$$\text{keep } \mu^+ \mu^- \text{ with } |m_{\mu^+ \mu^-} - M_{Z'}| \leq 200 \text{ GeV}$$



- Di-muon resonances with muons harder than naively expected: relevant for resonance width resolution

Dilepton resonances in 4-lepton final states

- Leptophilic interactions at hadron colliders
 - Big gain from larger CME
 - Interesting physics
 - Distinctive kinematics:
 - Multi-TeV dimuon resonances with muons typically harder than half the resonance mass
 - Di-tau resonances (not analyzed so far)