



# L0 Pileup Suppression Ideas

# PU fluctuations

- **Two sources of PU fluctuations:**

1. **From one event to the next**

Jet-areas subtraction

2. **Within the same event**

Non-uniform, eta-dependence

Mostly Ignored

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**Run 2:  $1/\sqrt{25} \sim 20\%$**

**Run 4:  $1/\sqrt{200} \sim 7\%$**

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**Impact of noise fluctuations  
decreases at high-luminosity**

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**event-by-event estimation  
of rho might not be as  
important in Run 4!**

# PU fluctuations

- **Proposal**
  - Use a constant  $\rho$  instead of an event-by-event calculation of the median PU density ( $\rho$ )
  - This approach can easily accommodate an  $\eta$ -dependent (global)  $\rho$ !
    - Addressing second source of PU fluctuation

# L0 PU Suppression

- Noise suppressed Tower constituents
- Use Global  $\rho(\eta)$  to subtract PU tower-by-tower
  - Tower  $E \rightarrow E - \rho(\eta) \times 0.1 \times 0.1$ 
    - Spread (or remove) negative E towers
    - Soft-killer based on global  $\rho(\eta)$
- No need for jet areas subtraction
- Can support any type of jet algorithm, not only cone
- Constituent-level suppression will improve jet shape discriminants
- Much faster and simpler to implement