Bs triggers at DØ

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The DØ trigger system

**Level 1**
- Subdetectors
- Towers, tracks, clusters, $E_T$
- Some correlations
- Pipelined

**Level 2**
- Correlations
- Calibrated Data
- Separated vertex
- Physics Objects $e, \mu, j, \tau, E_T$

**Level 3**
- Simple Reconstruction
- Physics Algorithms
Bs trigger strategy

- Muons, muons, muons...
  - Excellent purity and coverage
    - $p_T > 4$ GeV
    - $|\eta| < 2.0$, or $< 1.5$ if track matched
  - Triggers directly on semileptonic Bs signal
  - For hadronic decays it triggers on semileptonic decay of other B in the event
    - High cost, but all the events are flavor tagger
Luminosity profile

- Track matched single muon trigger would write 40 Hz at 100E30 – if allowed
  - so it gets prescaled
  - prescales reduced and pT cut (and track conditions) relaxed as luminosity goes down in a store.
A typical store
Hadronic $B_d$ signal

L = 250 pb$^{-1}$

- Single muon triggers

DØ Run II Preliminary

$N = 72 \pm 17 B_d^0$
Level 3 tracking

- We can do low $p_T$ tracking at L3!
  - $p_T > 0.5$ GeV
  - $|\eta| < 1.5$

- Allows for
  - IP filters
  - Inv. mass filters
Hadronic Bs signal

Bs triggers

- 5 GeV track matched muon
- 2 tracks
  - $p_T > 1.5$ GeV
  - IP sig > 3
- 2 tracks with invariant mass in the phi range
- Runs unprescaled at 100E30

$L = 70 \text{ pb}^{-1}$

DØ Run II Preliminary

$30 \pm 11 \, B_s^0 \rightarrow D_s^- \pi^+$