Preparations for first Physics

- Outline:
  - Intro to today’s meeting focused on the 1\textsuperscript{st} Paper on 1\textsuperscript{st} data
  - Physics datasets for 1\textsuperscript{st} data (900 GeV, 2TeV)
  - Plan for regular Monday, Friday meetings (starting Monday)
    - Other analyses on 1\textsuperscript{st} Data
    - Initial 7 TeV datasets and their evolution with integrated lumi.
    - Data placement
      - 1\textsuperscript{st} meeting Monday 23\textsuperscript{rd} at 18.00 in 40-5A-01
Need high quality results fast

- CERN requested all experiments to present results "soon after we take the data" at 900 GeV
- CMS Physics focus for 1st results to go public: Charged particle pseudorapidity and pt distributions
  - Also other analyses (discussed later), but less rushed

- Organize a team across all relevant groups to assure high quality in a short amount of time. Address the following:
  - How to determine all the numbers in the current draft notes
    - Convince CMS measurements & uncertainties are solid
    - Update the corresponding Analysis Notes
      - The critical backup documentation for approval.

- Begin work on a draft publication
Special considerations because it is the 1\textsuperscript{st}.

- The 1\textsuperscript{st} public display of the fruits of our labor
- It is an “All CMS” paper

- Must be ready fast

- The 1\textsuperscript{st} publication would combine the analyses [the pixel hit counting and the full tracking methods]
  - For expediency and due to the obvious overlap of topics and expertise.
    - If one analysis gets significantly delayed with respect to the other, it may be necessary to proceed with just one in the 1\textsuperscript{st} paper, and the other in a subsequent one.

- The publication board will help to draft the paper and get it to publication quality
  - In the interest of speed this would happen in parallel with the work to prepare and carry out the analyses, understand all systematics, and document it all in analysis notes.

- NOTE: If, in an incredible show from the machine, we get to 2 TeV data really fast, we may reconsider how much of that data to include as well. For now, our baseline is to get the 900 GeV results quickly for the CERN presentation and this 1\textsuperscript{st} publication.
Goals for today

- Hear from key areas needed for the 1st paper
  - Commissioning, Trigger, Tracker DPG, Tracker POG, QCD
- Begin to understand the detailed plan of work
- Form a team that cuts across all the relevant areas to address the work plan.
  - The key elements of this measurement are trigger and tracker performance, efficient data-taking, and tracking.
  - We need experts from these areas on this team if we are to get high quality results and hopefully get them quickly!
More 900 GeV (2.2 TeV) data analysis

- Our first collision data:
  - Opportunity for all Groups (PAG/POG/DPG)
  - Need to squeeze out all the interesting information

- Data can be used for
  - Physics measurements
    - $dN/d\eta$ as discussed today but also Underlying Event, FWD physics, possibly $J/\psi$’s if we get “2+” TeV etc.
  - Calibration and alignment studies
  - Tests of complex future analyses (e.g. isolation criteria)
  - Training (finally move out from MC phase ... !)

- Lots of possible “activities”
900 GeV (2.2 TeV) preparation

- Need coordinated effort in order to be efficient:
  - Define the interesting 900 GeV (2+ TeV) activities
  - Define useful datasets
  - Distribute them broadly to T2’s with the shortest delay
  - Join efforts to overcome difficulties
  - Establish a quick communication channel

What we faced in the October exercise
So we can use the exercise as a guide.
Each DPG/POG/PAG define their relevant **activities**

- Fewer than OCT X: **focus on the really important studies**
- Some groups (QCD, Tracking, e/γ, μ) with more than one
  - Others may just want to define one activity for training
- The DPGs may want to pick out the activities for which participation in a communication forum could benefit

Some results (plots) shown at the CERN seminar

- So need to be thorough but efficient and fast
Organizational Issues

- Three meetings per week [Mon 18:00, Wed 15:00 (plenary), Fri 14:00]
  - Mon and Fri will mostly focus on PAG, POG-DPG issues
    - Quick minutes after Mon, Fri meetings: these will last typically one hour
  - Wednesday plenary includes all major coordination areas
    - Rooms being secured

- HN Forum

- Main TWiKi and TWiKi for each exercise ala OCT X

Kick off mtg Mon. 23rd at 18:00 in 40-5A-01
Now have a draft plan for first collisions
  - Draft of Stream A Physics datasets discussed here

Have draft 8E29 trigger menu, PDs and SDs
  - Need to integrate OCT X experience & PH needs into SD design
  - Need to prepare a plan and tools for how we’ll modify datasets (with changes to the triggers) for the reality of real data

Higher luminosities
  - We’ll design higher lumi trigger menus based on existing MC-based menus (1E31, 1E32) and experience with data
  - How will we evolve PDs, SDs, and add Central Skims (CS)?
    - Need to think about this now - from simple things like naming conventions... to how and where we will produce, validate, distribute, re-reco...
Content is driven by the (very limited) physics

- O(1 Hz) interesting events (8E29 menu, no L3 rejection)
- O(100-600 Hz) Min Bias (no prescale)
- O(500-1000 Hz) Zero Bias (Stream B – see backup slides)

Observe general guidelines (as used for 8E29)

- Reasonably similar sizes for PDs & not too much overlap
- No PD too large to be distributed to 3rd largest T1
Primary Datasets - \( O(200 \text{ Hz}) \)
1. Min Bias - \( O(100 \text{ Hz}) \) – currently est. to be 100% of these triggers
2. Zero Bias - \( O(100 \text{ Hz}) \) – roughly 1% of these triggers
3. "Startup Physics" - \( O(20 \text{ Hz}) \)
   - \( O(1 \text{ Hz}) \) all "interesting events" + \( O(10 \text{ Hz}) \) of Min Bias (~10%) + \( O(10 \text{ Hz}) \) of Zero Bias (~0.1%)
   - Rates/fractions of min & zero bias are not fixed in stone yet, but PD#3 should be "portable"
   
   NB: May need tweaking when we see real trigger rates (but the basic idea will remain same).

Physics Secondary Dataset - \( O(\text{few Hz}) \)
1. All of the interesting events \( O(1 \text{ Hz}) \) (and \( O(2 \text{ Hz}) \) of Min + Zero bias?)

Physics Express Stream (ES) - \( O(20 \text{ Hz}) \)
- PD#3 above – Startup Physics

Why these choices?
- PD#1 is all the min bias and not unreasonable in size (events are small)
- PD#3 has the most interesting events + plenty of min & zero bias
  - Adequate for most studies and to setup the others for running on higher stats min & zero bias
- ES=PD#3= the most comprehensive and versatile sample. Rate comparable to our target for higher Lumi
- SD#1 pulls out all of the “very interesting” events while remaining “laptopable”

Make first data accessible to all of CMS quickly:
- E.g. SD#1 - 24 hours of recorded collisions with 300 kB/event at 2 Hz = 52 GB
- Can distribute SD#1 quickly and just about everywhere
- PD#3 would also be something we would work to distribute broadly
First stage: getting to 8E29
- Have a draft of 8E29 PDs and SDs (see backup slides)
- Will need modifications once we see real data
- We will need a plan for how to evolve them for higher luminosities as the triggers evolve.
  - Changes, new datasets, central skims etc.

Discussions in the Mon, Fri meetings (mentioned earlier) and the TSG
Additional Info
Separate out some triggers into Stream B

- Useful in real data taking to protect having to split all the PDS due to one hot trigger
- Useful in commissioning to put high rate Zero Bias and prioritize processing
- Can leave extreme rate back-up triggers on SM until resources were available

*Ian Fisk – Computing Readiness Review Nov.11, 2009
http://indico.cern.ch/conferenceDisplay.py?confId=73524
<table>
<thead>
<tr>
<th>Dataset</th>
<th>Rate (Hz)</th>
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<tr>
<td>JetMonitor</td>
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<td>Jets</td>
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<td>Met_HT_BTag_HSCP</td>
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<td>MuMonitor</td>
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<tr>
<td>Mu</td>
<td>25.34</td>
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<tr>
<td>EleGammaMonitor</td>
<td>24.87</td>
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<td>EleGamma</td>
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<td>DoublePhoton5_Res</td>
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<td>Tau</td>
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<tr>
<td>MinB</td>
<td>13.59</td>
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<tr>
<td>BH_Forward</td>
<td>7.48</td>
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<tr>
<td>TOTAL TABLE RATE</td>
<td>139.2</td>
</tr>
<tr>
<td>TOTAL DATA ON DISK</td>
<td>185.74</td>
</tr>
<tr>
<td>TOTAL OVERLAP</td>
<td>34%</td>
</tr>
</tbody>
</table>
The total overlap among all the PDs is 34%
Legend: a “1” in the cell of X label SD_L1Mu and Y label /MinBias indicates that the sample /MinBias will be used to populate the SD_L1Mu. The rightmost yellow columns shows how many time we will have to run on a sample, the orange line indicates how many samples populate an SD (signals excluded).

Note that wrt previous presentations we added 5 highPt lepton/dilepton samples to the Ele and Mu SDs. These will available with an equivalent integrated lumi of O(10)pb-1

Roberto Rossin – Wed. Plenary meeting Oct. 23
http://indico.cern.ch/conferenceDisplay.py?confId=68686
### Plugging in the numbers with a step in energy

<table>
<thead>
<tr>
<th>Month</th>
<th>OP scenario</th>
<th>Max number bunch</th>
<th>Protons per bunch</th>
<th>Min beta*</th>
<th>Peak Lumi</th>
<th>Integrated</th>
<th>% nominal</th>
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<tbody>
<tr>
<td>1</td>
<td>Beam commissioning</td>
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<td>2</td>
<td>Pilot physics combined with commissioning</td>
<td>43</td>
<td>$3 \times 10^{10}$</td>
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<td>$8.6 \times 10^{29}$</td>
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<td>3</td>
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<td>4</td>
<td></td>
<td>156</td>
<td>$5 \times 10^{10}$</td>
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<td>~9 pb$^{-1}$</td>
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<td>5a</td>
<td>No crossing angle</td>
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<td>~18 pb$^{-1}$</td>
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<tr>
<td>5b</td>
<td>No crossing angle – pushing bunch intensity</td>
<td>156</td>
<td>$1 \times 10^{11}$</td>
<td>2</td>
<td>$6.9 \times 10^{31}$</td>
<td>~36 pb$^{-1}$</td>
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<td>6</td>
<td>Shift to higher energy: approx 4 weeks</td>
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<td>7</td>
<td>4 – 5 TeV (5 TeV luminosity numbers quoted)</td>
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<td>$7 \times 10^{10}$</td>
<td>2</td>
<td>$4.9 \times 10^{31}$</td>
<td>~26 pb$^{-1}$</td>
<td>3.4</td>
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<tr>
<td>8</td>
<td>50 ns – nominal Xing angle</td>
<td>144</td>
<td>$7 \times 10^{10}$</td>
<td>2</td>
<td>$4.4 \times 10^{31}$</td>
<td>~23 pb$^{-1}$</td>
<td>3.1</td>
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<tr>
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<td>50 ns</td>
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<td>2</td>
<td>$8.8 \times 10^{31}$</td>
<td>~46 pb$^{-1}$</td>
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<td>10</td>
<td>50 ns</td>
<td>432</td>
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<td>2</td>
<td>$1.3 \times 10^{32}$</td>
<td>~69 pb$^{-1}$</td>
<td>9.4</td>
</tr>
<tr>
<td>11</td>
<td>50 ns</td>
<td>432</td>
<td>$9 \times 10^{10}$</td>
<td>2</td>
<td>$2.1 \times 10^{32}$</td>
<td>~110 pb$^{-1}$</td>
<td>12</td>
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</tbody>
</table>

Note: OCT X SD’s pertain to earliest data
## Candidate Menu for First Collisions

From /online/cosmic/week44/CMSSW_3_3_0/override/HLT/V1

### L3 paths

- HLT_BTagIP_Jet50U
- HLT_BTagMu_Jet10U
- HLT_DoubleEle5_SW_L1R
- HLT_DoubleMu0
- HLT_DoubleMu3
- HLT_Ele10_LW_L1R
- HLT_Ele10_LW_EleId_L1R
- HLT_Ele15_SC10_LW_L1R
- HLT_Ele15_LW_L1R
- HLT_Ele15_SiStrip_L1R
- HLT_Ele20_LW_L1R
- HLT_ISOmu3
- HLT_Mu3
- HLT_Mu5
- HLT_Mu9
- HLT_ISOtrack_8E29
- HLT_Photon15_TkIsol0_L1R
- HLT_TkMu3_NoVertex

### L1 and L2 paths

- HLT_L1Jet6U
- HLT_Jet15U
- HLT_Jet30U
- HLT_Jet50U
- HLT_FwdJet20U
- HLT_DiJetAve15U_8E29
- HLT_DiJetAve30U_8E29
- HLT_Jet15U
- HLT_Jet30U
- HLT_Jet50U
- HLT_FwdJet20U
- HLT_L1MET20
- HLT_MET45
- HLT_MET100
- HLT_HT100U
- HLT_L1MuOpen
- HLT_L1Mu
- HLT_L1Mu20
- HLT_L2Mu9
- HLT_L2Mu11
- HLT_L1DoubleMuOpen
- HLT_L1SingleEG5
- HLT_L1SingleEG8
- HLT_L1DoubleEG5
- HLT_DoublePhotons5_eeRes_L1R
- HLT_DoublePhotons5_Jpsi_L1R
- HLT_DoublePhotons5_Upsilon_L1R
- HLT_Photon10_L1R
- HLT_Photon15_L1R
- HLT_Photon15_LooseEcalIso_L1R
- HLT_Photon20_L1R
- HLT_Photon30_L1R_8E29
- HLT_DoublePhoton10_L1R
- HLT_SingleLooseIsoTau20
- HLT_DoubleLooseIsoTau15
- HLT_STOPpedHSCP_8E29
- HLT_L1Mu14_L1SingleEG10
- HLT_L1Mu14_L1SingleJet6U
- HLT_L1Mu14_L1ETM30
- HLT_ZeroBias
- HLT_ZeroBiasPrescaled
- HLT_Mu
- HLT_Mu20
- HLT_Mu9
- HLT_Mu11
- HLT_L1DoubleMuOpen
- HLT_L1SingleEG5
- HLT_L1SingleEG8
- HLT_L1DoubleEG5
- HLT_DoublePhotons5_eRes_L1R
- HLT_DoublePhotons5_Jpsi_L1R
- HLT_DoublePhotons5_Upsilon_L1R
- HLT_Photon10_L1R
- HLT_Photon15_L1R
- HLT_Photon15_LooseEcalIso_L1R
- HLT_Photon20_L1R
- HLT_Photon30_L1R_8E29
- HLT_DoublePhoton10_L1R
- HLT_SingleLooseIsoTau20
- HLT_DoubleLooseIsoTau15
- HLT_STOPpedHSCP_8E29
- HLT_L1Mu14_L1SingleEG10
- HLT_L1Mu14_L1SingleJet6U
- HLT_L1Mu14_L1ETM30
- HLT_ZeroBias
- HLT_ZeroBiasPrescaled
- HLT_Mu
- HLT_Mu20
- HLT_Mu9
- HLT_Mu11
- HLT_L1DoubleMuOpen
- HLT_L1SingleEG5
- HLT_L1SingleEG8
- HLT_L1DoubleEG5
- HLT_DoublePhotons5_eRes_L1R
- HLT_DoublePhotons5_Jpsi_L1R
- HLT_DoublePhotons5_Upsilon_L1R

### L3 paths prescaled away in /user/apana/332_noL3/CosmicWeek44/override/V4

Need to check CPU performance of HLT_L2MuNoVertex before deployment