Pixel Dynamic Inefficiency
Pixel Efficiency Trends

FED errors and bad modules are eliminated
Dynamics Efficiency Loss

- Max efficiency is 99.95%: small systematics in the measurement
- „Low instantaneous lumi”: efficiency loss seems mostly due to buffer filling
- „High instantaneous lumi”: there is also a common offset
Efficiency Along a Fill

- Efficiency loss can be parametrized by the instantaneous luminosity and read-out (L1 trigger) rate
- FED errors and bad modules / ROCs are excluded
- Efficiency on Layer 2 and 3 is better than 99.6% so far

Work in progress:

~65 kHz
Efficiency in L1 rate bins

![Graphs showing efficiency vs. instantaneous luminosity for different rate bins.](image_url)
Parametrization of L1 rate bins
Geometric dependence of efficiency

The efficiency also depends on ‘eta’
Signs of the beam off-set
Update on 2012 data
Next steps

- We need to redo parametrization on 2012 data and update results, so we need ntuples (Alberto)
- We need to consolidate results and pick most significant variables (Viktor and Janos)
  - Inst lumi
  - Num of vertices
  - L1 trigger rate (in bins)
  - Geometric dependence: modules, ladders
  - BX dependence
- Need to insert parametrization in simulation modules (Viktor)
- Need simulation that approximates data in the desired parameters as much as possible
  - Generate MC (Silvia)
  - Data/MC comparison plots (Silvia?)
  - Make ntuples for efficiency calculation (Alberto)
  - Testing simulation modules on MC – will require multiple running (Silvia, Alberto?)
Scheduling

• Step 1 (get the data)
  – Alberto starts making ntuples from data
  – Janos prepares plots to run on ntuples
  – Viktor tries to understand the code of the simulation guys
  – Silvia generates more simulation with large statistics

• Step 2 (determine optimal parametrization)
  – Janos and Alberto remakes plots, we decide how to parametrize efficiency loss
  – We scale the efficiency with these parameters and make Data-MC comparison plots
  – In case of disagreement, reiterate on simulation of relevant parameters

• Step 3 (the actual implementation)
  – Viktor implements parametrization in MC
  – Silvia regenerates MC with new modules
  – Alberto and Janos remake ntuples and plots