Online event data monitoring for PEP-II
(Occupancies, beam spots, etc.)

Gregory Dubois-Felsmann

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Overview

• A lot of information is available from the detector that may be useful for PEP-II…
  – Background levels, for tuning the cleanness of collisions
  – Luminous region position and size
  – Background levels due to trickle injection

• Some of this is already being collected
  – Existing Level 3 trigger, Fast Monitoring code

• Some requires developing new online components; in progress
  – Precision beam spot/size monitoring
  – Fast occupancy feedback

• New tools for collecting and displaying available information in MCC are being developed
Information available / of interest in event data

• During stable collisions:
  – Detector system occupancies
    These can be computed from:
    • Event sizes in bytes from various levels of granularity: detector system, DAQ crate, ROM
    • Numbers of hits, perhaps including detector system-specific hit quality requirements, including their location in the detector

    PEP-II has indicated their interest in using these quantities for operator feedback
    • Desire updates at a few hertz in order to avoid PIO; 1 Hz is practical minimum

  – Position and dimensions of the luminous region
    • Obtained by looking at the vertex distribution of detected tracks, ideally from clean events like di-muons, non-radiative Bhabhas
    • Limited statistics: cannot update at “knob rate” – reasonable precision available with 1-10 min. of data
    • Precision derives from a) precision of tracking, b) averaging
• During trickle injection

  – Occupancies due to injection
    Times of injection pulses are known, thus:
    • The effects of injection can be excluded from the “stable beams” measurements on the previous page, and
    • Specific measurements on the occupancies due to injection can be made

    • This requires sampling event data “near” the injection pulse, and so requires “breaking through” the 2D “smart inhibit” window (see DataFlow presentations)
      – Possible in a basic way already with current breadboard electronics
      – Dedicated electronics being designed/built with stronger sampling capabilities
Current status

• Some of this information is already available

  – Level 3 trigger
    Accumulates information on every L1Accept
    • Event sizes by crate
    • Occupancies of DCH, EMC, L1T
    • L3Dch tracking-based beam spot data
    • See talk by Rainer…

  – Fast Monitoring
    Samples L1Accepts, currently at ~125 Hz
    • A wide variety of occupancy histograms for each detector system,
      including “geographic” information on hit locations
Current status – displays

• Online event monitoring data is essentially in the form of DHP histograms
  – Level 3 and Fast Monitoring histograms are viewable “live” in JAS in IR-2, as well as virtually anywhere else by RemoteBabarJas.
    • Based on a “pull” protocol
    • Update intervals are administratively limited on the client side to about 10-15 seconds (rate was set to be suitable for data quality monitoring)
    • The core infrastructure can currently support update rates of O(3Hz) on the Level3 farm (summed over all active queries). The limiting factor is the collection of histograms from all the nodes in a farm (L3: 30, FM: 15).
      – There is room for improvement of O(4x), perhaps more, from parallelization.
  – Level 3 provides a process (L3TPcaServer) that queries DHP histograms, abstracts and republishes information as EPICS channels
    • Framework is applicable to any abstraction of DHP information and can be replicated as needed
New data collection tools

• Envisioned:
  – Extensions to Fast Monitoring
    • For occupancy monitoring during / not during injection
    • Progress has been slow due to conflicts for gpdf time
    • Will require code inputs from detector systems when requested
  – Full tracking online
    • For beam spot position and dimension monitoring
    • Prototype available from Gerhard Raven for XTC file data, equally applicable to trickle stream
    • Need to sort out issues with calibration of SVT alignment
New data display tools

• Ideal PEP-II display would combine DataFlow and event monitoring data in a single GUI for use by operators
  
  – Amedeo Perazzo is working on this
  • Will integrate odfMon, VMON, and DHP inputs
  • Will operate at high speed and provide >1 Hz updates of displays
  • Will archive information for a period of a few days and make readily retrievable
Display GUI sample...