Subject: Background references for Beam rf effects
Posted by mwoods on Wed, 01 Dec 2004 17:48:03 GMT
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1. EMI (electro-magnetic interference) effects for vertex detectors
 I believe the only observed effects on vertex detector readout have been from the SLD
 experiment. I'm not an expert on this, but I'll summarize my current understanding of the SLD experience.
 This will be summarized better by Marty Breidenbach at the MDI Workshop.

 At SLD, it took ~200 ms to read out the VXD, longer than the 8 ms between bunches (120 Hz operation).
 In order to be able to read out the CCD VXD without noise problems we had to suppress
 charge transfer shifting for ~10 microsec around beam time. This effect (and cure by suppressing shifting at beam time)
 was observed only for VXD3 detector and not for VXD2. VXD2 was used thru 1995 and VXD3 was used in 1996-1998.

2. HOM (higher-order mode) heating for the B-factories and for HERA,
 the observed effects have been beampipe heating which can lead to potential background problems
 from increased vacuum pressure. Some references on this:
    - http://www.slac.stanford.edu/pubs/slacpubs/9000/slac-pub-937 2.html
       (High Order Mode Heating Observations in the PEP-II Interaction Region)
    - http://www.interactions.org/cms/?pid=1014128 (DESY press release on HERA performance: an excerpt from
 this reads "It has been a long and hard struggle to get HERA back into successful operation after a challenging upgrade
 in the years 2000 and 2001. Unexpectedly severe backgrounds prevented the two collider experiments H1 and ZEUS from
 taking data when HERA restarted in 2001. The main causes were found to be the strong heating of the beam pipe due to the
 short positron bunches and the intense synchrotron radiation from the positrons close to the experiments. These resulted
 in a degradation of the vacuum – the spray of particles from the interaction of the proton beam with the residual gas
 produced the unacceptable backgrounds."

3. Bunch lengths at different colliders: SLC (1mm), LEP (10mm), PEP-II (12mm), KEK-B (7mm), HERA e+ (8mm), ILC (0.3mm).
 A comparison of beam rf effects at SLC, PEP-II and ILC and possible scaling with charge and bunch length,

is considered on slide 48 of Woods' talk at Victoria,
  http://www.linearcollider.ca:8080/lc/vic04/plenary/mike_wood s.pdf

4. Summary of references
 SLD,LCD:
  C. Damerell, http://hepwww.rl.ac.uk/damerell/Daresbury-LCFI-LCABD-Connect ions.ppt
  SLD VXD3 NIM paper, http://www.slac.stanford.edu/pubs/slacpubs/7000/slac-pub-738 5.html
  C. Damerell at LCWS2004, http://agenda.cern.ch/askArchive.php?base=agenda&categ=a
04172&id=a04172s60t2/transparencies

PEP-II HOM:
   http://www.slac.stanford.edu/pubs/slacpubs/9000/slac-pub-937 2.html

HERA:
  http://www.triumf.ca/people/miller/HERA/herabg_II_slides.pdf
 http://www.interactions.org/cms/?pid=1014128

Subject: Discussion on EMI for Vertex Detector
Posted by mwoods on Wed, 08 Dec 2004 01:34:54 GMT
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Here are notes from a meeting at SLAC, held Dec. 7, 2004 prompted by some discussions with
Chris Damerell:
Attending: Nick Sinev, John Jaros, Ray Arnold, Tim Nelson, Marty Breidenbach, Jim Brau, Mike
Woods

related presentations planned for MDI Workshop:

Marty: SLD experience with VXD2, VXD3
Marty: Signal Processing / DAQ planned for most of SiD (excluding very forward region and
VXD); having 4
sample/hold per train (occupancy will be ok) for each detector pixel and then reading out between
trains
Mike (or other victim to be found): review LCWS 2004 talks for DAQ session and summarize
signal processing
 / DAQ plans presented there
Nick: describe current status of VXD3, including readout system, and describe a beam test that

can be carried out in ESA where we can provide 10Hz beam with single bunches, 2e10 charge, with bunch lengths in range 100 microns to 1mm (SLD bunch length was 1mm)

other talks planned in beam rf session:

PEP-II higher-order mode beampipe heating; Mike Sullivan (to be confirmed)

 other talk possibilities for beam rf session:

 BaBar electronics: EMI mitigation in vertex or wire chamber? I'll contact Natalie Roe (also maybe Dave
Nelson) for the vertex chamber and Mike Kelsey for the wire chamber and see if there might be something of interest to present
UA1 VXD experience: I talked to Tom Markiewicz who recalls that the initial beam pipe was too thin to have enough skin depths for the higher beam rf harmonics; some possible contacts on this:
 Kate Morgan (friend of Nan and I'll ask Nan how to contact), Guryn at Brookhaven, Ann Kiernan (retired?). Also may be documented in a NIM paper?
theory talk on calculating HOMs: Perry Wilson?
rf shield included in NLC ZDR in "pant-leg" region of the crossing angle geometry?

other notes:

The EMI observed with SLD VXD3 was not in shifting/clocking of CCDs (this clocking was always blanked out around beamtime and could be a separate problem if there were no blanking); problem was with the fiber optic link losing its phase lock (there was no fiber optic link for VXD2) need to check for additional notes/documentation on VXD3 EMI problem: Vavra? Mentioned in any of the UK theses on VXD?

Subject: Additional references from MDI Workshop and IPBI meeting
Posted by mwoods on Wed, 25 May 2005 00:10:21 GMT
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1. There was a session on Beam RF effects and EMI at the MDI Workshop in January. See
    http://www-conf.slac.stanford.edu/mdi/sessions/beamrf.htm
2. Some references from the MDI Workshop are available at
     http://www-conf.slac.stanford.edu/mdi/sessions/references/be amrf_refs.htm
3. Some talks at LCWS 2005 in April:
i) Test beams talk on tracking and vertexing by D. Bailey,

http://heppc12.uta.edu/~yu/research/linear-collider/lcws2005 -tb/bailey.pdf
ii) DAQ talk by M. Woods,
 http://www.slac.stanford.edu/xorg/lcd/ipbi/lcws05/Woods_MDI_ and_DAQ.pdf
iii) MDI talk by M. Woods,
 http://www.slac.stanford.edu/xorg/lcd/ipbi/lcws05/Woods_Beam RF.ppt
iv) Plenary talk on vertex detectors by C. Damerell,
http://hepwww.rl.ac.uk/damerell/Vertex_Detectors_and_LC.ppt
4. At the May IPBI meeting there was a presentation by Steve Smith on EMI and a compilation of
reference studies at SPEAR and PEP by Sherwood Parker -- see
    http://www.slac.stanford.edu/xorg/lcd/ipbi/monthlymeetings/0 4may2005/agenda.html