
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-Connections.ppt>

SLD VXD3 NIM paper, <http://www.slac.stanford.edu/pubs/slacpubs/7000/slac-pub-7385.html>

C. Damerell at LCWS2004, <http://agenda.cern.ch/askArchive.php?base=agenda&categ=a04172&id=a04172s60t2/transparencies>

PEP-II HOM:

<http://www.slac.stanford.edu/pubs/slacpubs/9000/slac-pub-9372.html>

HERA:

http://www.triumf.ca/people/miller/HERA/herabg_II_slides.pdf

<http://www.interactions.org/cms/?pid=1014128>