

VIPIX testbeam

Analysis of timing info in data

BCO counter (trigger time)

BX counter (event-formatting time)

BCO vs BX

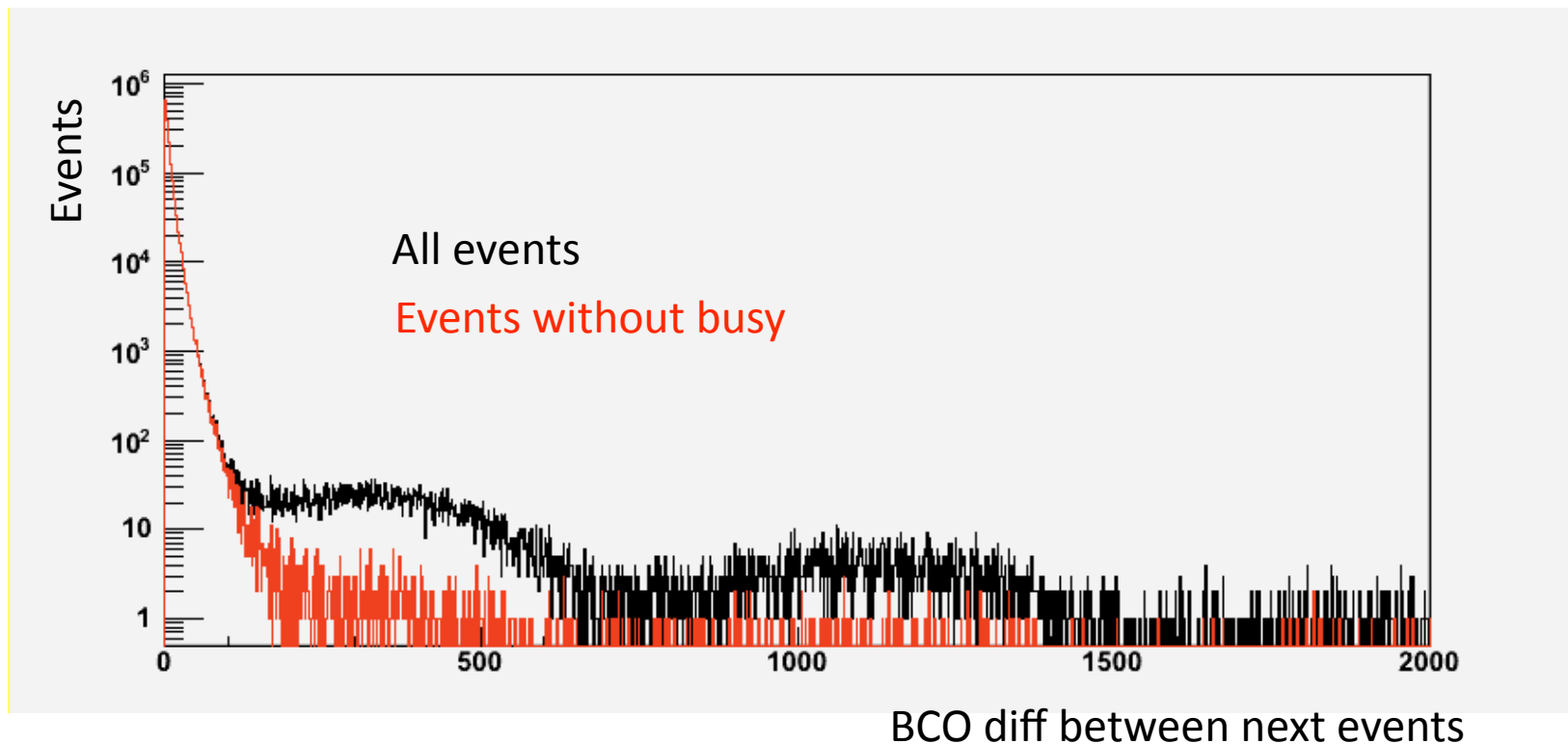
- BCO samples time in slices of $5.05 \mu\text{s}$ (this is also the minimum time between triggers)
- BX samples time in slices of 25 ns
- Both are stored in a 32-bit int ($\sim 4.3 \times 10^9$)
- BCO counter never reset during a run
- BX counter reset every 107 s
- $1 \text{ BCO} = 202 \text{ BX}$ when there is no dead time and events need not waiting in Stratix fifos

Method

- Identify busy by looking for BX shorter than 202 (events pushed out of Stratix at maximum rate when the Robin is emptied after busy)
- Calculate time to fill Robin (initial fraction of data-taking without dead-time)
- Get delivered rate from first, dead-time free part of spill
- Study beam intensity profile via trigger rate in first part of spill
- Compare trigger rate in first-part /full spill period
- Number of events between busy show details of Robin configuration
- Use large BCO identify inter-spill periods (assume no triggers between spills)
- Repeat everything on few runs

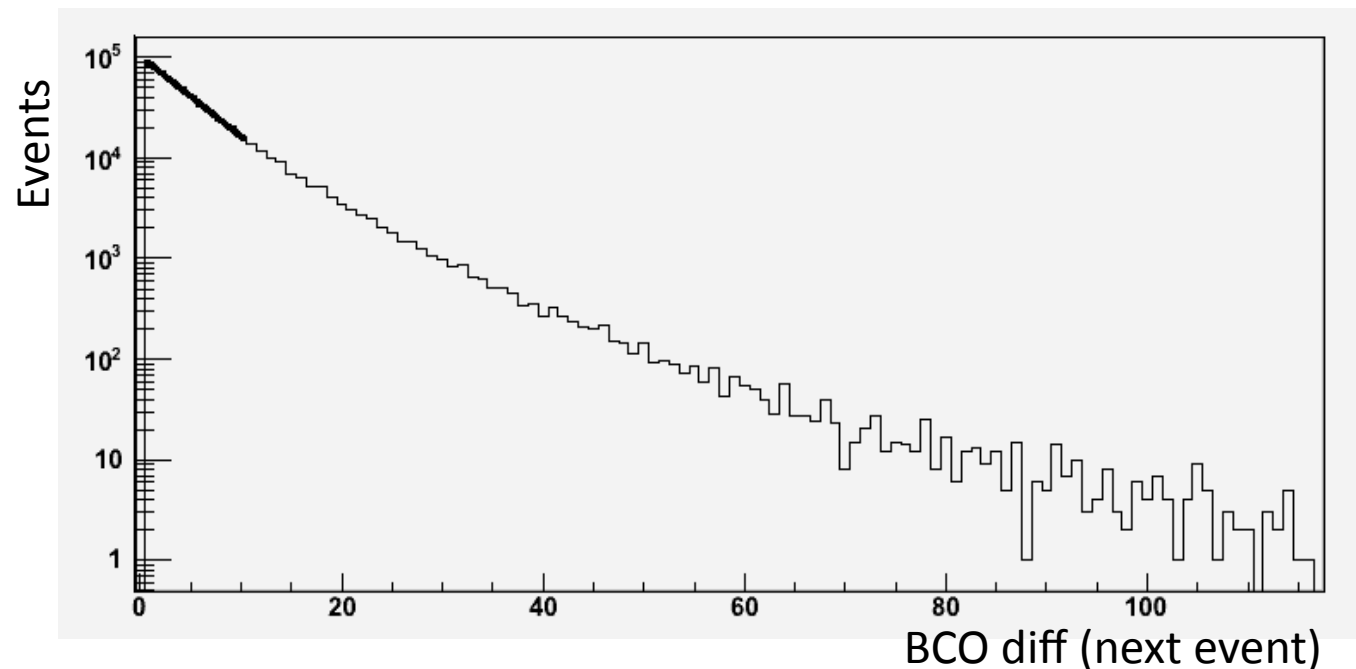
BCO distributions

- BCO difference between next events (time interval between two triggers)

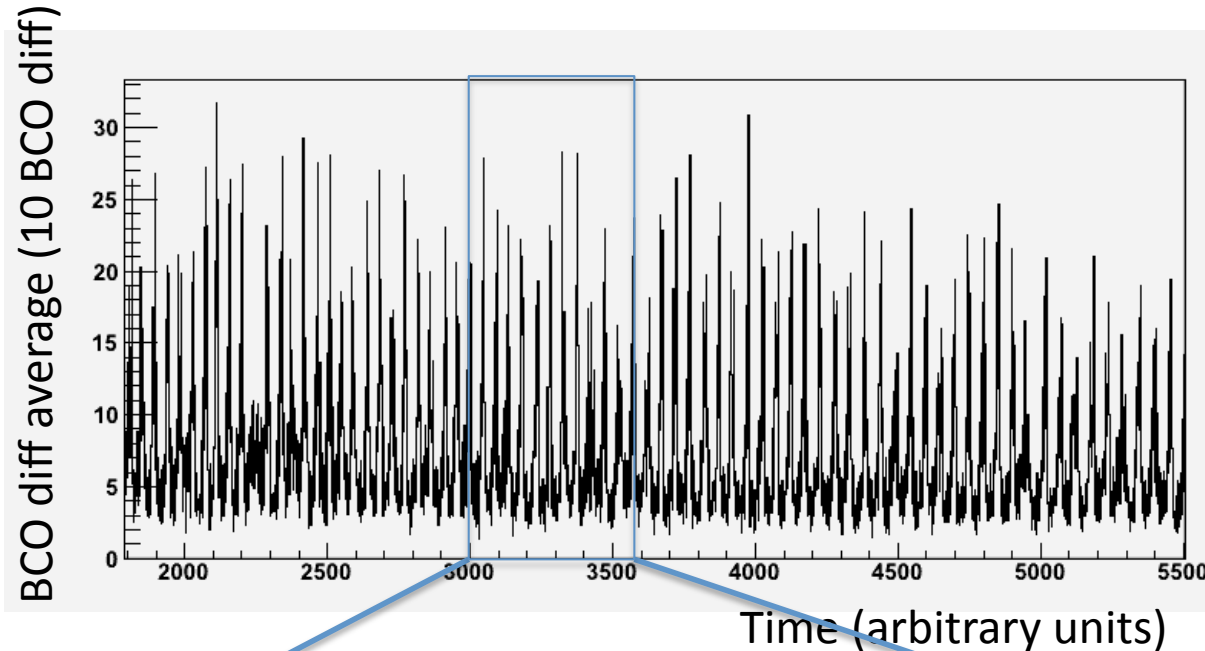


Delivered trigger rate

- Fitting exp at the beginning of BCO distributions gives about 35KHz. However, this is a maximum rate (beam distribution over spill?)

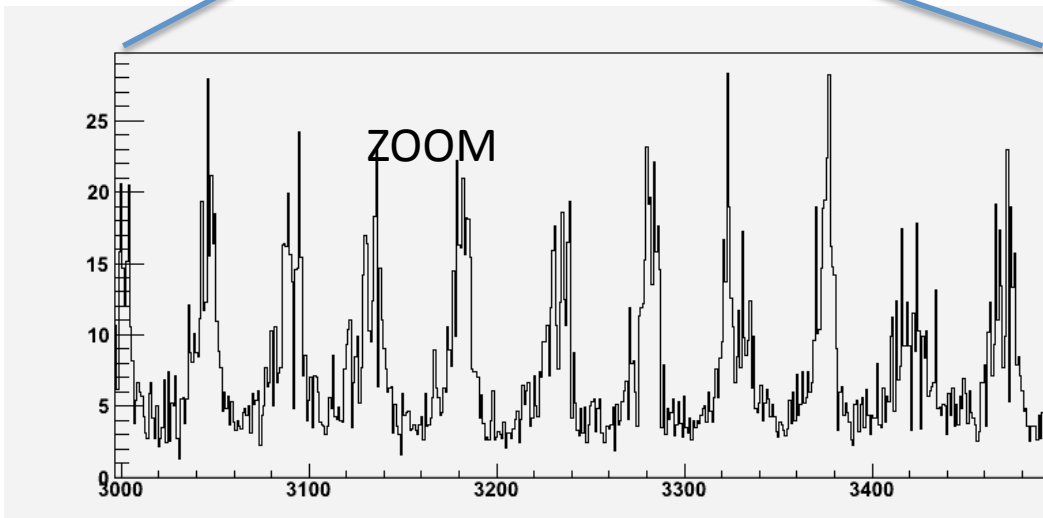


Beam intensity from trigger time



Look at first part
of spill, before
first busy is found
(typically 4-5 s)

DAQ able to follow details
of beam structure!!

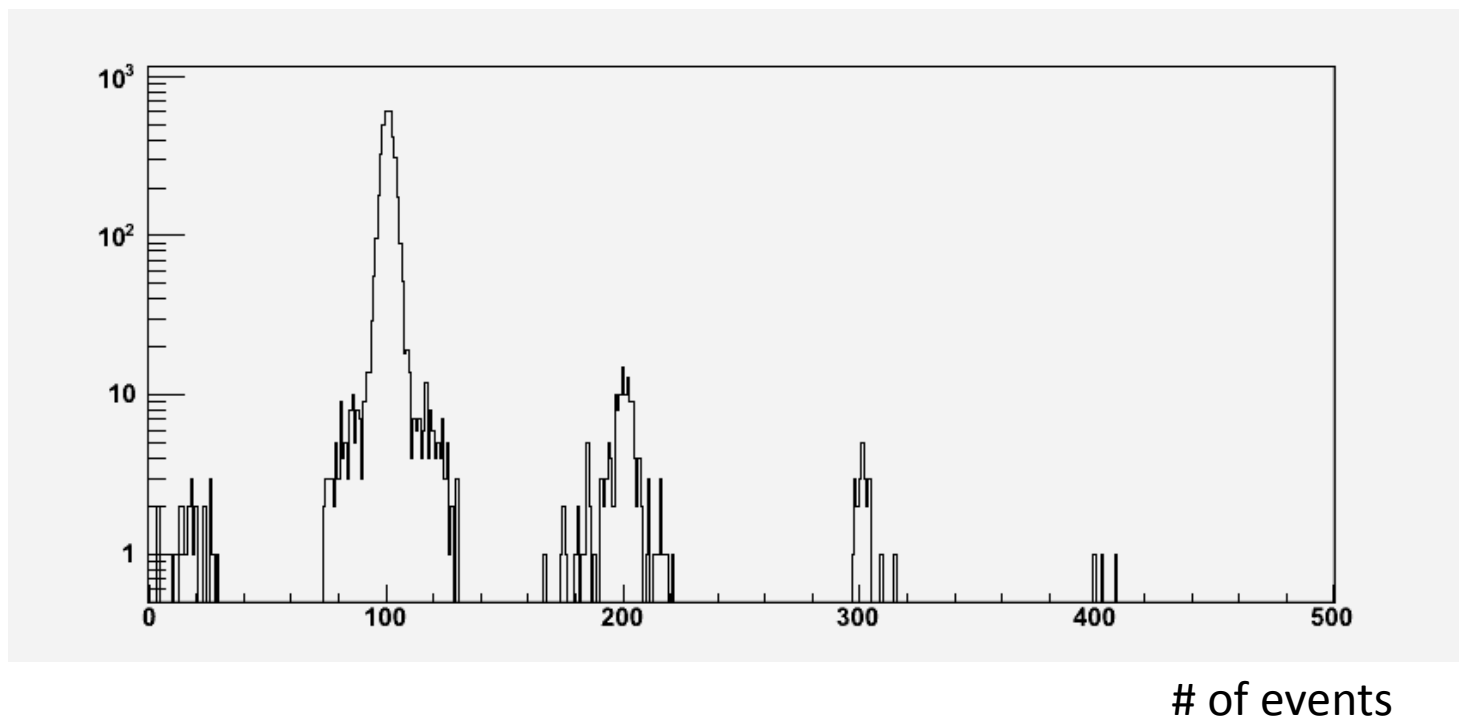


Es: Run 2411

Average trigger rate
in first seconds of
spill = 26.0 kHz

Average over entire
spill = 23.9 kHz

Events between busy



Once the Robin is full, events are deleted in bunches of 100 (Delete Grouping Parameter in configuration), e.g. memory is freed after 100 events are written to disk and 100 « delete » requests are cumulated.

Spill & Inter-spill times

- Spill duration 9.5 s
- Inter-spill time varies between 35 and 41 s
(depends on run, not all runs studied yet)

Summary

- Recorded timing information allows us to determine delivered and recorded rate (extract fraction of dead-time/efficiency)
- About 50% of spill time without losses
- Timing information allow us to infer details on spill structure
- Use « typical » numbers for the paper, or average over all runs (analysis is rather fast)?