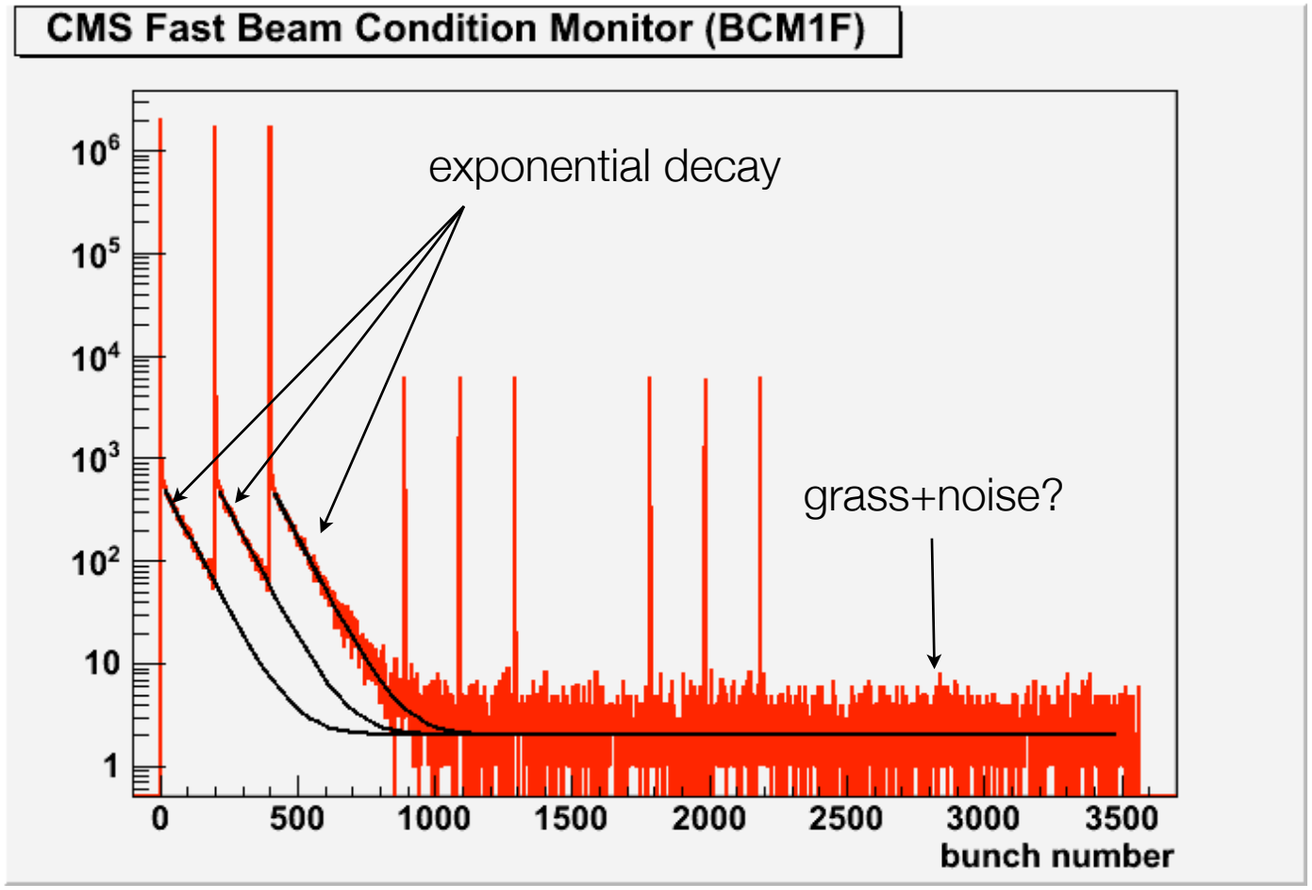
BCM1F Status Report

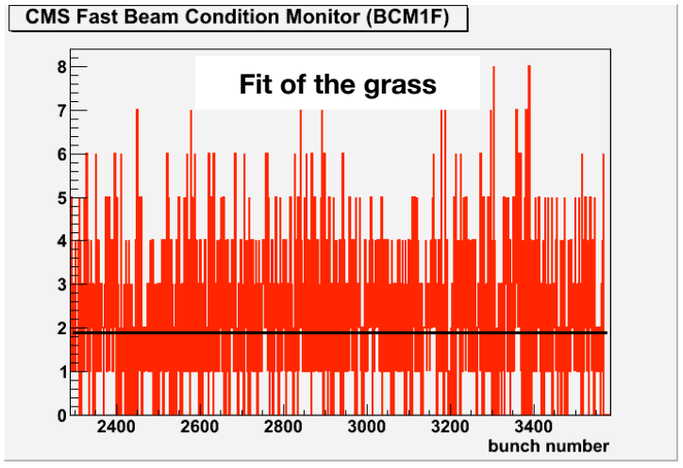
Roberval Walsh
DESY

DESY-CMS meeting
05.07.2010
on behalf of the BCM1F and BRM groups

CMS detector after-glow effect

- Long tails observed in the time distribution along the LHC orbit in colliding bunches associated to decay.
- Tails fit well an exponential giving a decay lifetime of 2.12 μs or 85 bunch numbers.
- “Grass”?



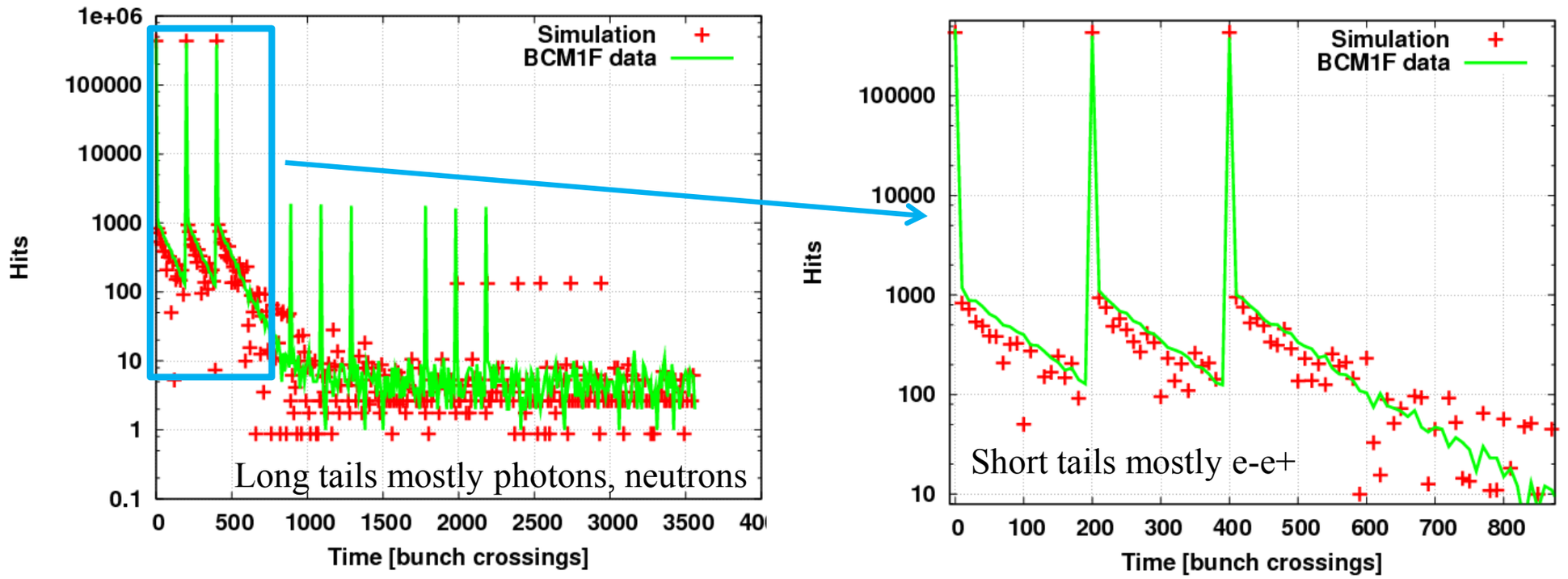


S. Mueller's simulation with FLUKA

CMS detector after-glow effect

BCM1F time of flight for PP –update-

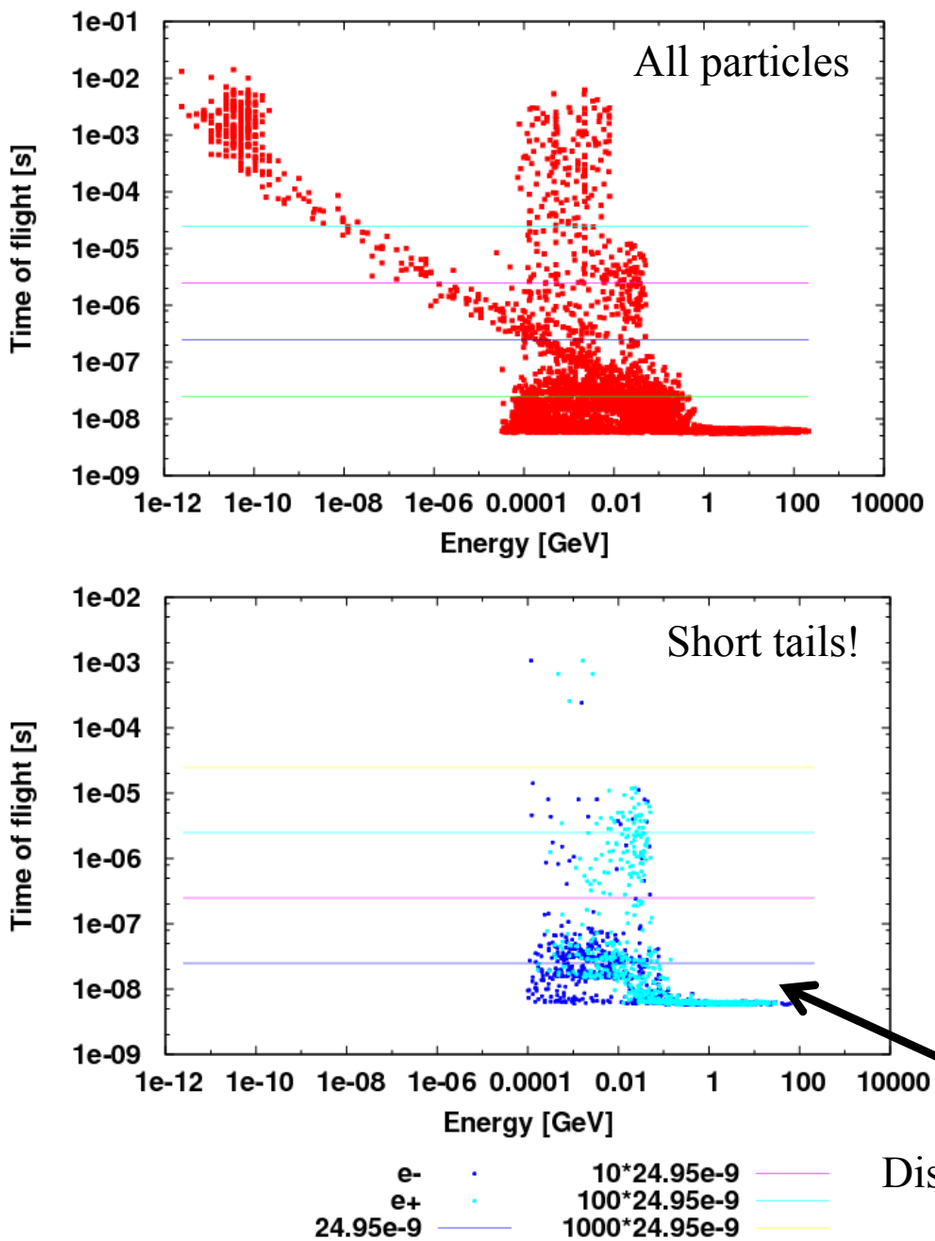
- Good agreement.
- Afterglow data can be understood from simulation.
- Composition of tails in terms of particle type and energy is ongoing work.

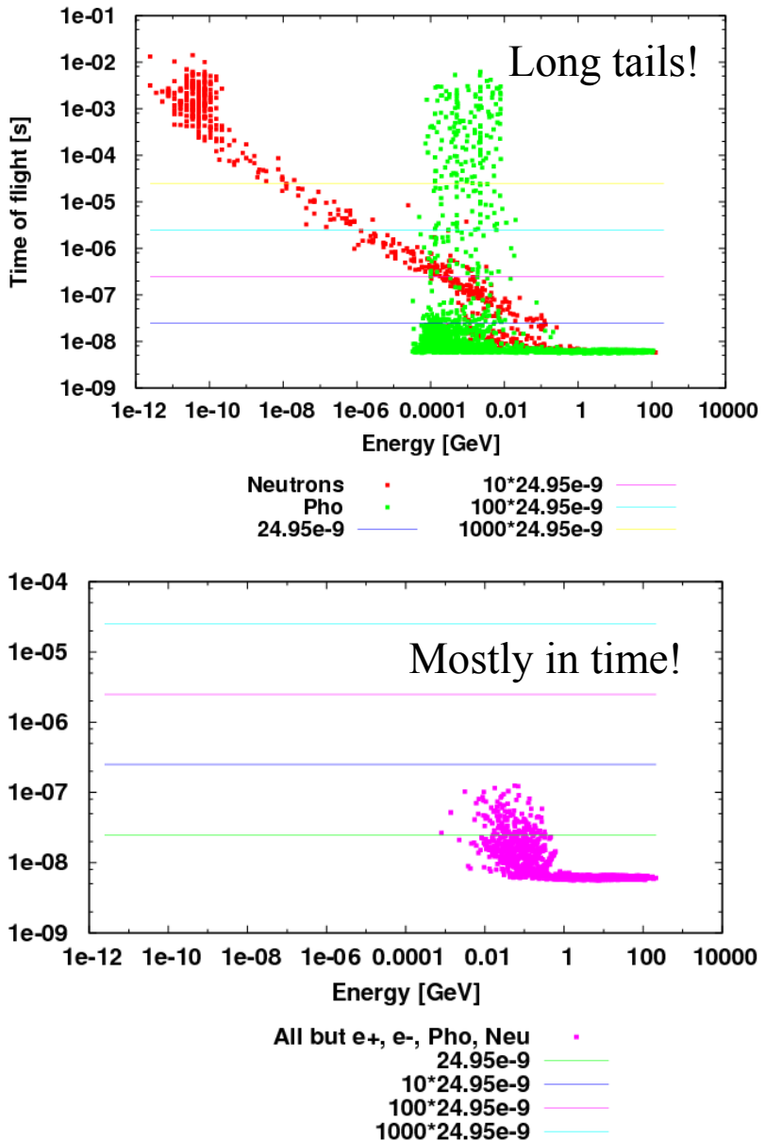


S. Mueller's simulation with FLUKA

CMS detector after-glow effect

BCM1F tof details - update -





Discreet clusters in time!

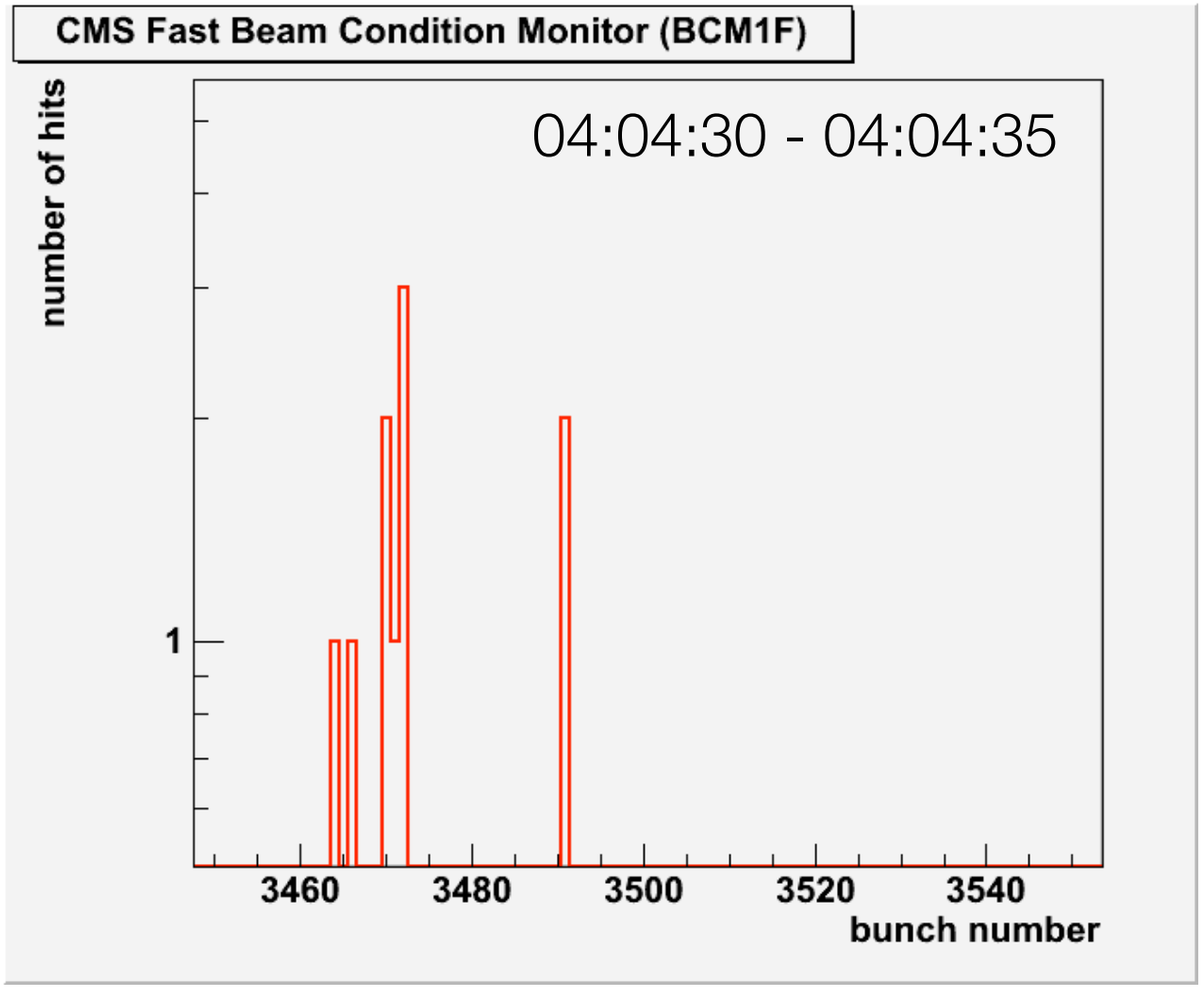
LHC asynchronous beam dump

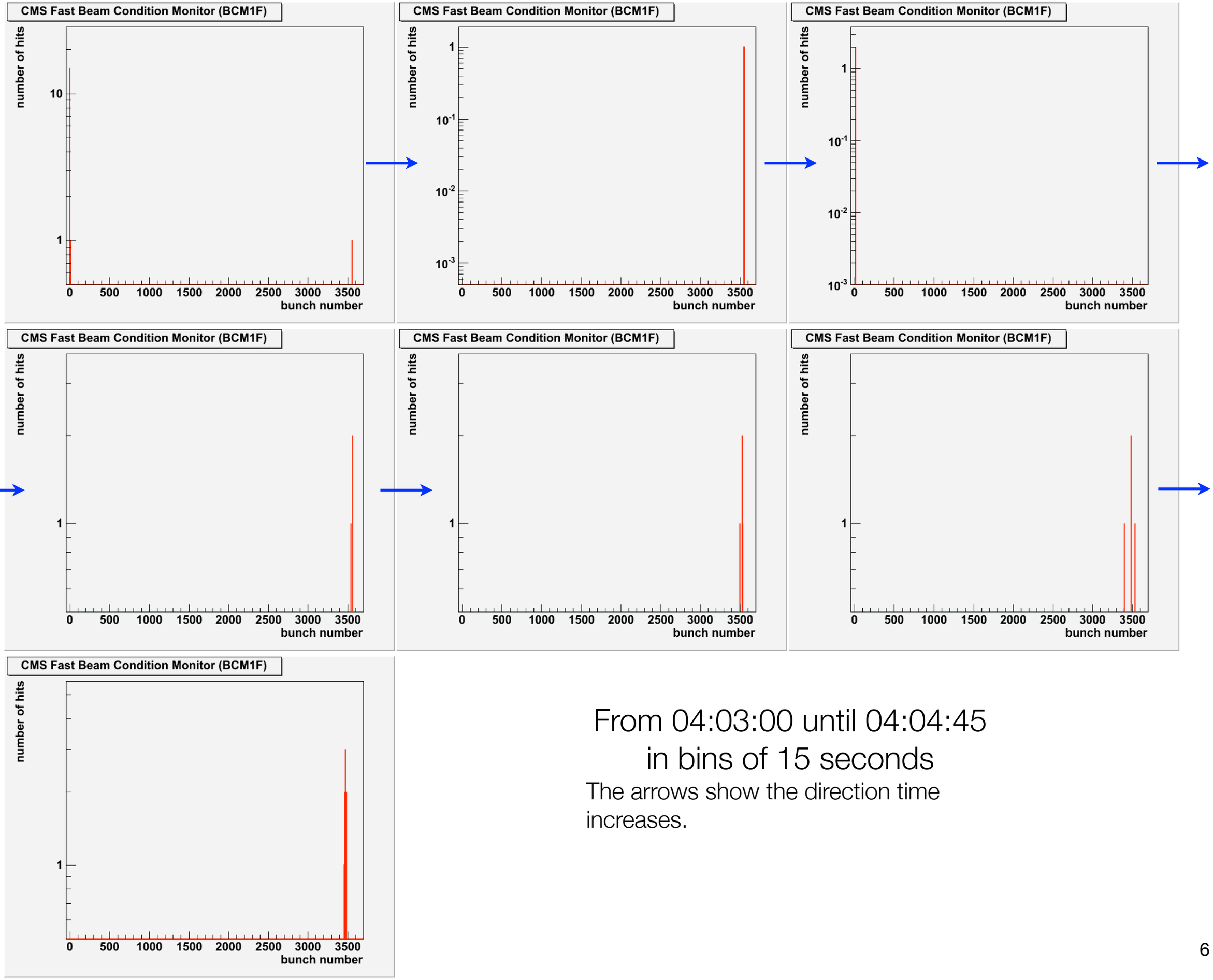
- LHC exercised an asynchronous beam dump (RF switched off) on 24.06.2010 at 04:04:33 CEST.

- BCM1F registered an interesting effect: Particles arrived earlier, they went into the abort gap.

  - Energy loss: synchrotron radiation, beam-gas interaction.

  - With the energy loss the particle flew in a trajectory with smaller radius.





From 04:03:00 until 04:04:45
in bins of 15 seconds

The arrows show the direction time increases.

Upgrades related to BCM1F

Technical stop: Decembre/Jan 2010/11: very likely no access

Shut down (one year) 2012: demontage/montage because of pixel/PLT

Expect radiation damage of the FE-ASIC and laser diode, replacement has to be prepared.

Shut down (one year) 2015: replacement of BCM1F and BSC

BCM1F:

- faster ASIC

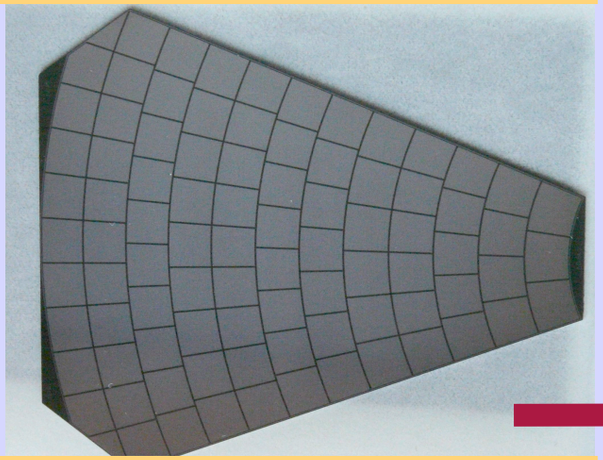
- Digital optical signal transmission

BSC: preparation of GaAs pad detectors (R&D project within AIDA)

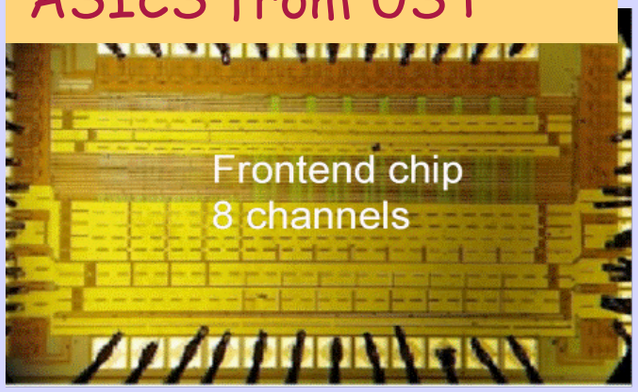
Testbeam in August at DESY

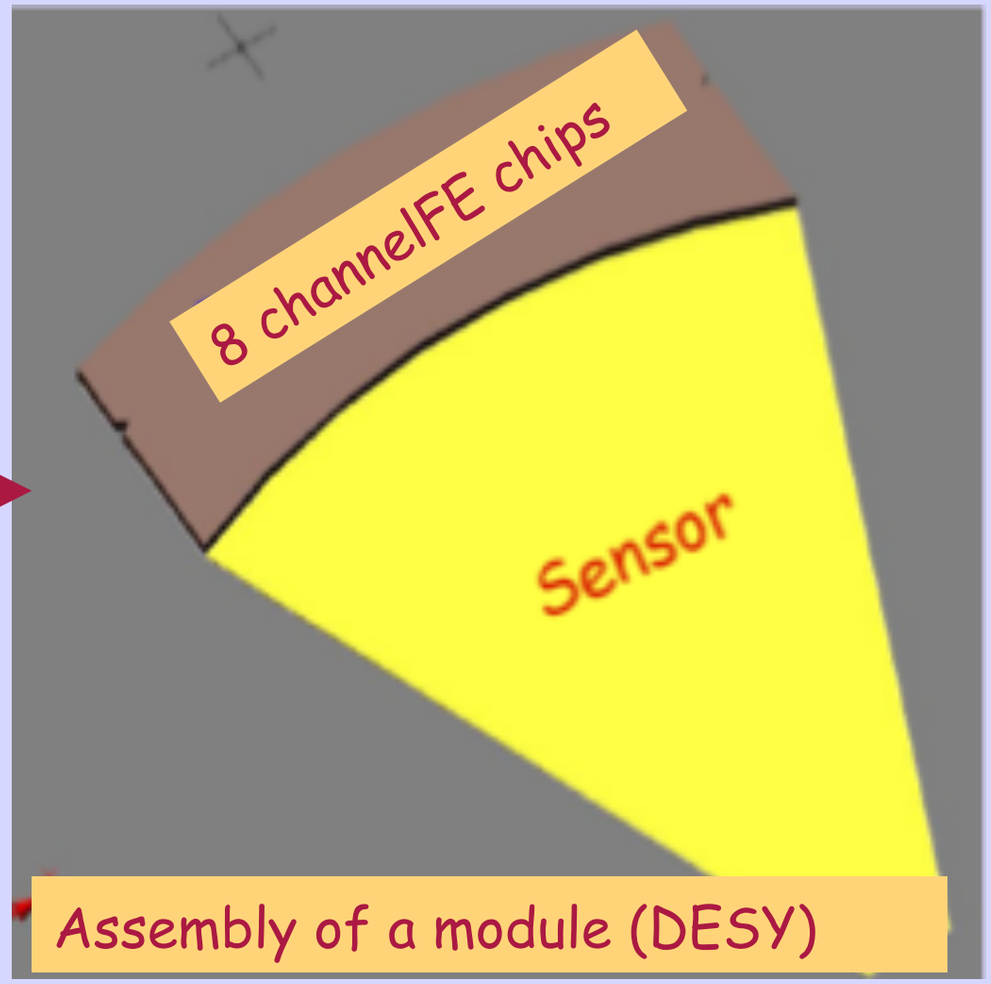
A first prototype will be tested in an electron beam in July/August

Sensors from JINR

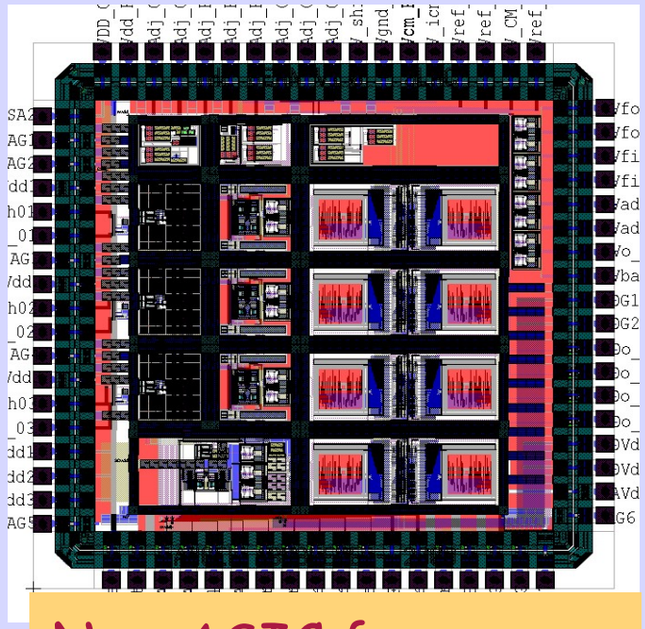


ASICS from UST





Assembly of a module (DESY)



New ASIC from Stanford/SLAC

.18 μm TSMC

(to be used later)

These ASICs are not a priory radiation hard- needs further discussions

Outlook

- General status of BCM1F is very good. Readout components (Scaler, ADCs and TDCs) are working fine and producing important results.
- Detector after-glow effects observed with BCM1F. Simulations helping getting better understanding of such effect.
- A very interesting effect, where low-energy particles arrive earlier than the beam, observed during asynchronous dump.
- Plans for BCM1F upgrade on 2010 are presented. Testbeam with first prototype in July/August.

Backup slides

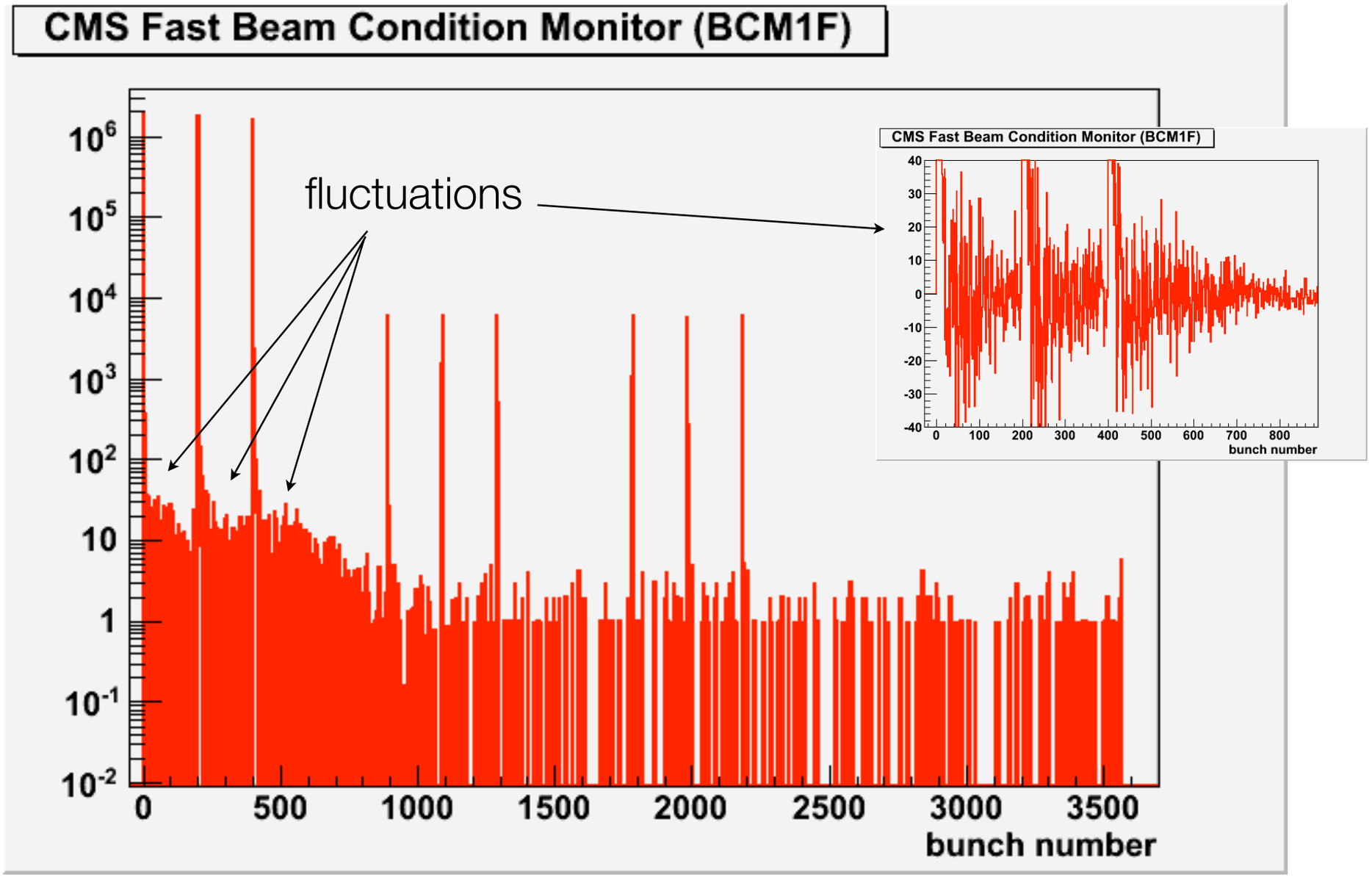
After-glow fit

- The tails were fitted to exponentials, f(x) = exp(p0+p1x).
- The after-glow contributions from previous colliding bunches where subtracted.
- The grass was fitted to a constant (C=2) in a range at the end of the orbit. This contribution was subtracted.

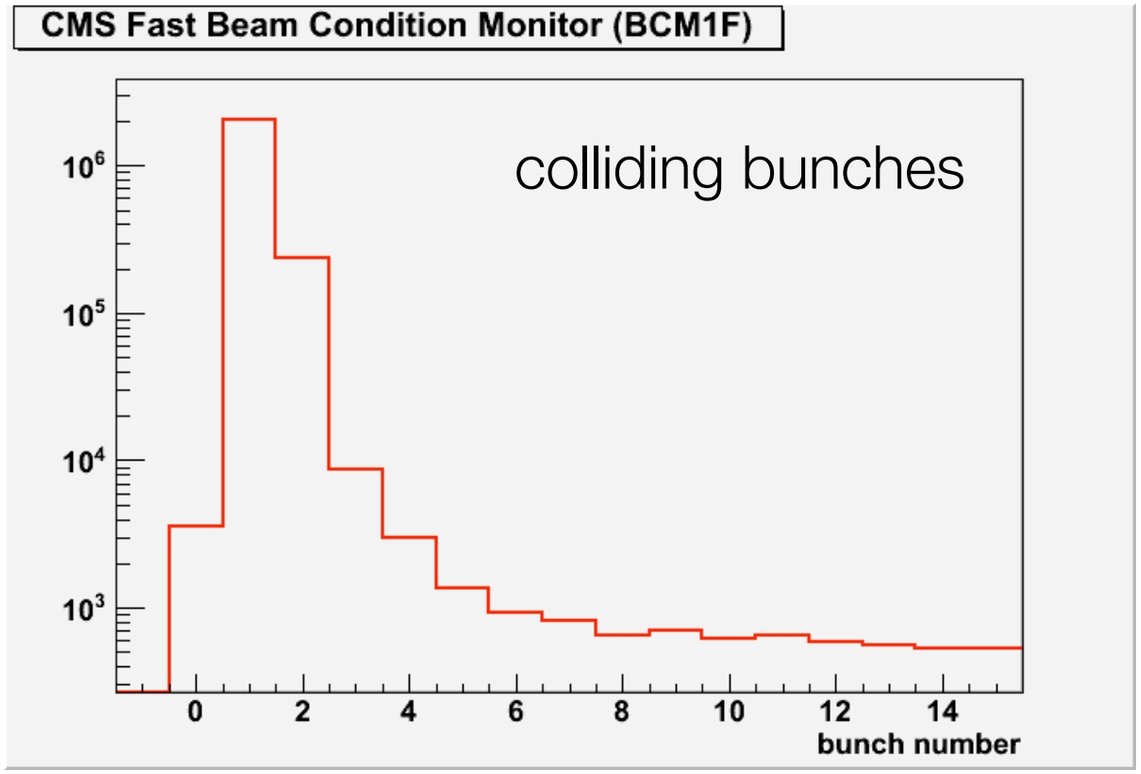
- Fit results

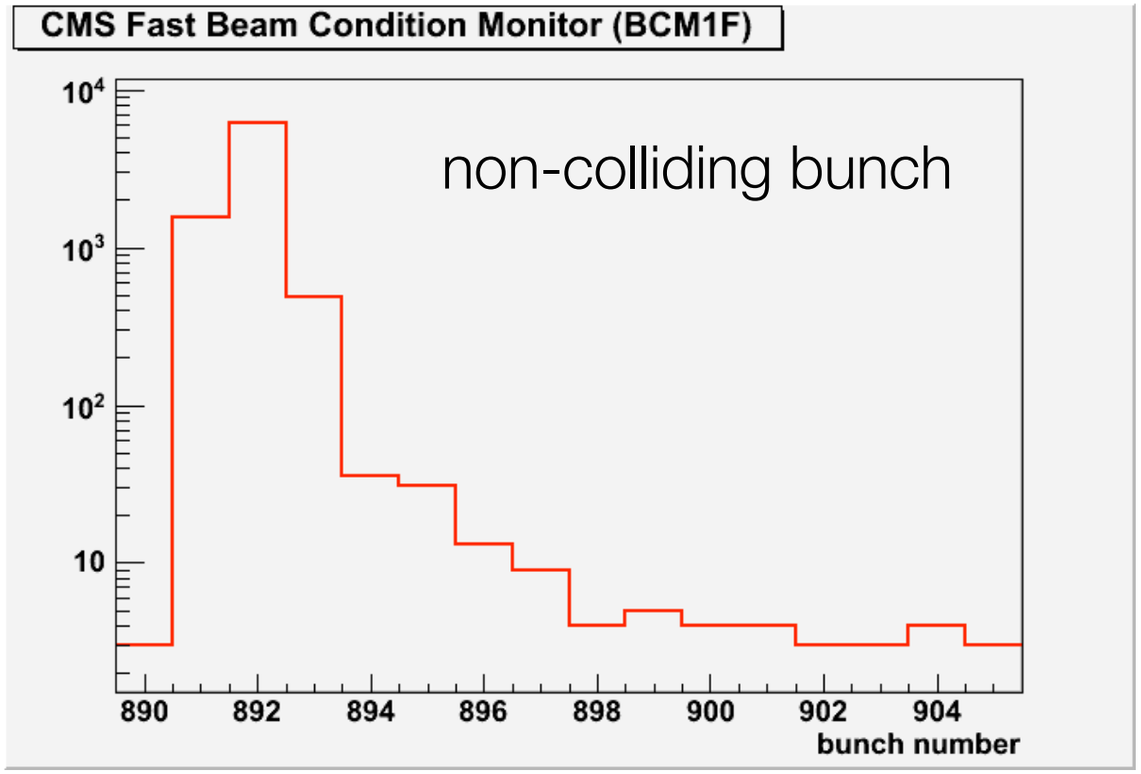
	p0	p1($\times 10^{-2}$)	χ^2/dof
1st colliding bunch	6.41±0.01	-1.18±0.01	1.02
2nd colliding bunch	8.61±0.04	-1.18±0.01	1.04
3rd colliding bunch	10.94±0.06	-1.18±0.01	1.07

Subtracting after-glow and grass



After-glow short-tails





- Near the beam peak, beam background has similar fast-falling trend for both colliding and non-colliding bunches.