

BRAN

a luminosity detector for LHC

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BRAN History

- Project started in 1997 in Berkeley
- Endorsed by CERN in 1999
- Many key people left the project before the 2003 CERN workshop
- Part of LARP since 2003

BRAN specs in 2003

- Bunch by Bunch capability (40 MHz) using pulse shaping and deconvolution
- Crossing angle measurement
- Radiation hard system, capable of surviving 10 years of LHC operation at high luminosity
- 1% resolution (10% BbB)

View in 2003

- LBNL delivers a turn key system for the measurement of the luminosity for LHC (inside the TANs thus ATLAS and CMS)
- LBNL takes care of all the hardware, CERN takes care of the control

Evolution of initial view

- CERN stepped up the activity in the project:
 - took care of cable, piping and infrastructure needs
 - regular discussions with LBNL and feedback during the development
 - local support for tests and installation

Limitations

- LBNL is far away from CERN
- Limited direct contacts
- Interactions only after long periods of development and thus late feedback
- Lack of clear technical contacts in Berkeley most of the time
- LHC management refused extra resources

Main sources of delay

- 40 MHz qualification
 - lot of time spent looking for a way to test
- Radiation resistance
 - lot of time spent looking for a suitable testing
- None could be fully validated in the end

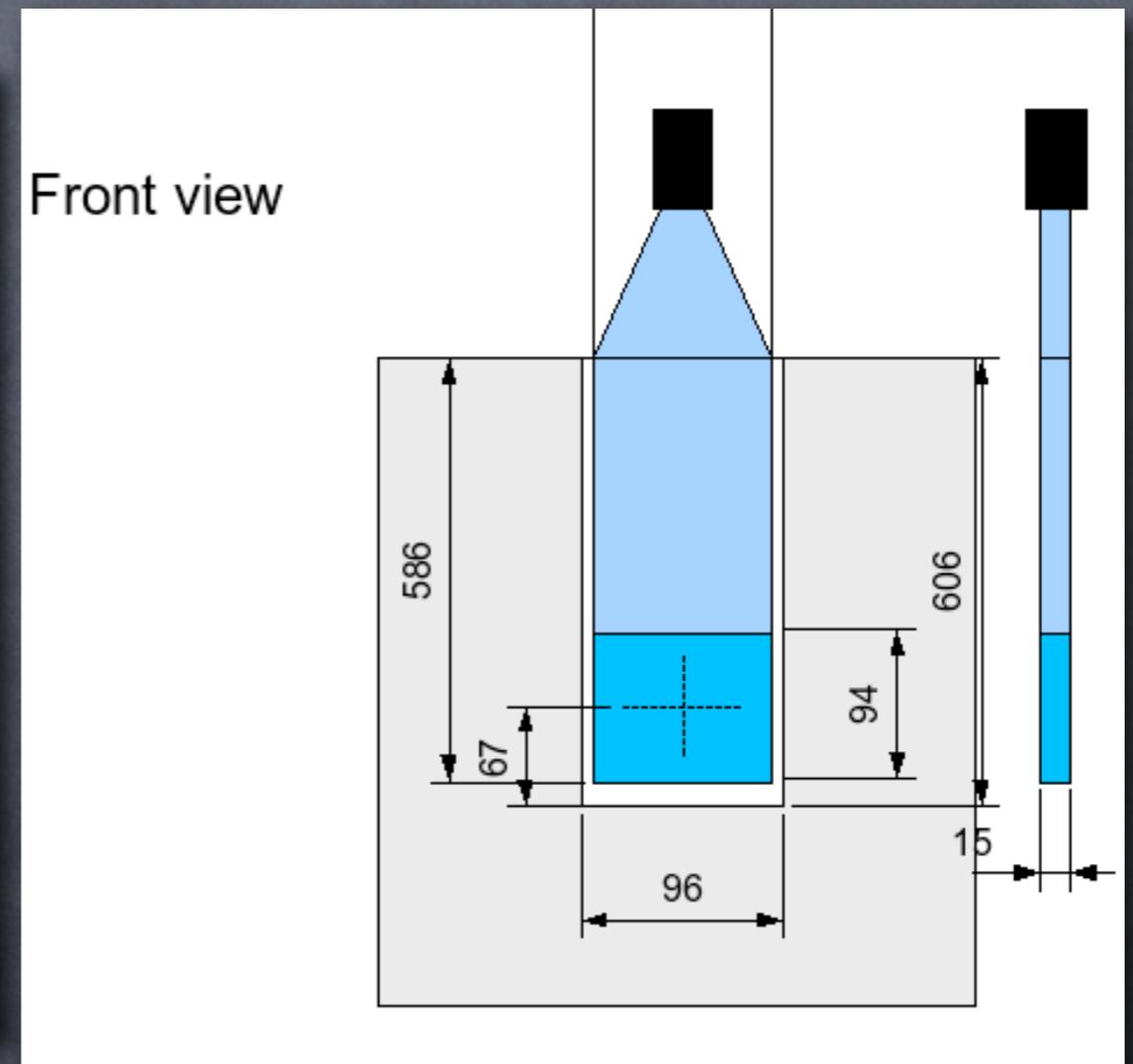
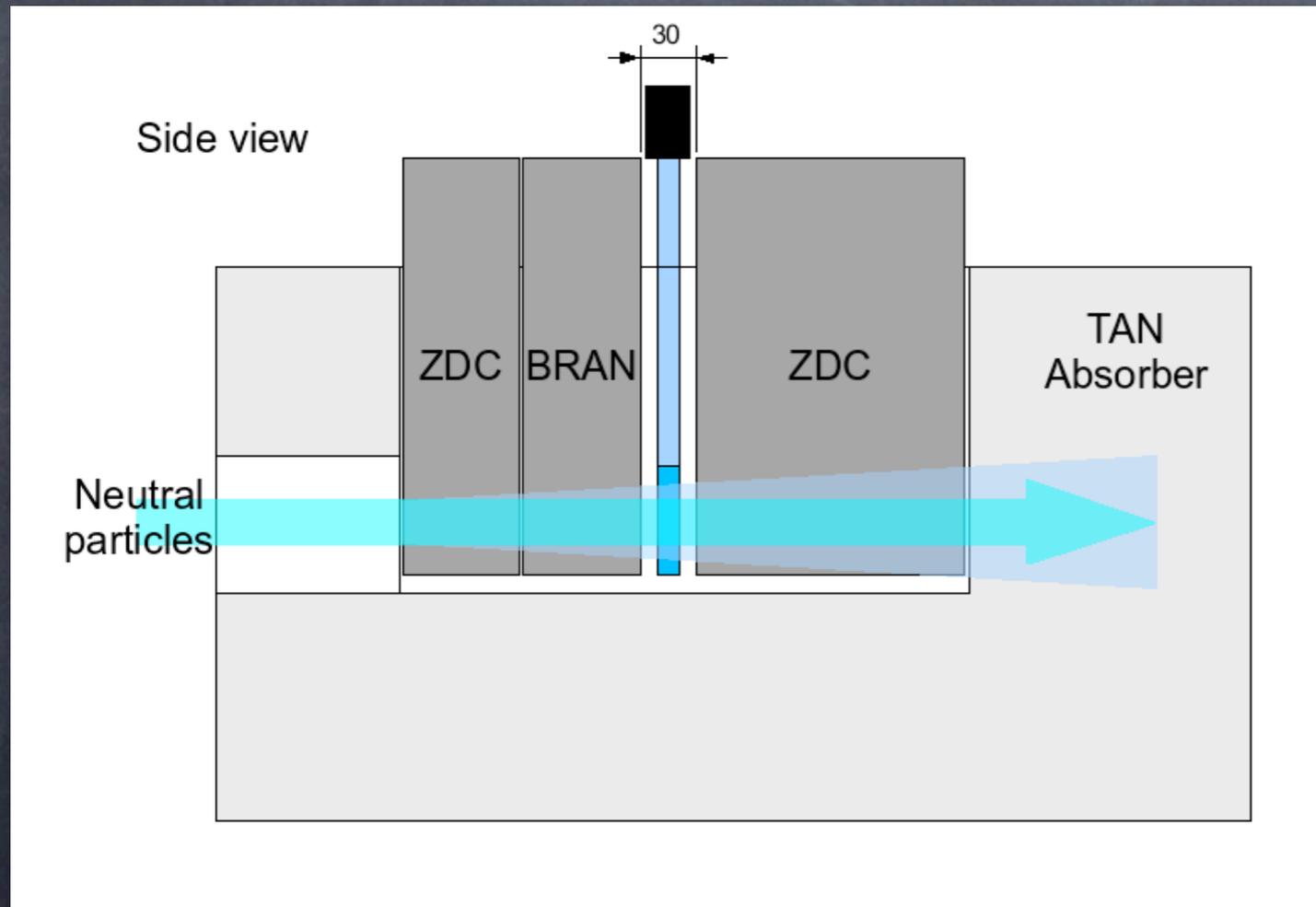
Way ahead

- Need to have the 4 detectors working by early 2009. Nominal LHC startup May '09
- Detectors do not stand bake-out, need to cope with this
- Detectors not fully qualified in test beams, commissioning will be long
- Use of Scintillators during the initial phase

BRAN-PMT

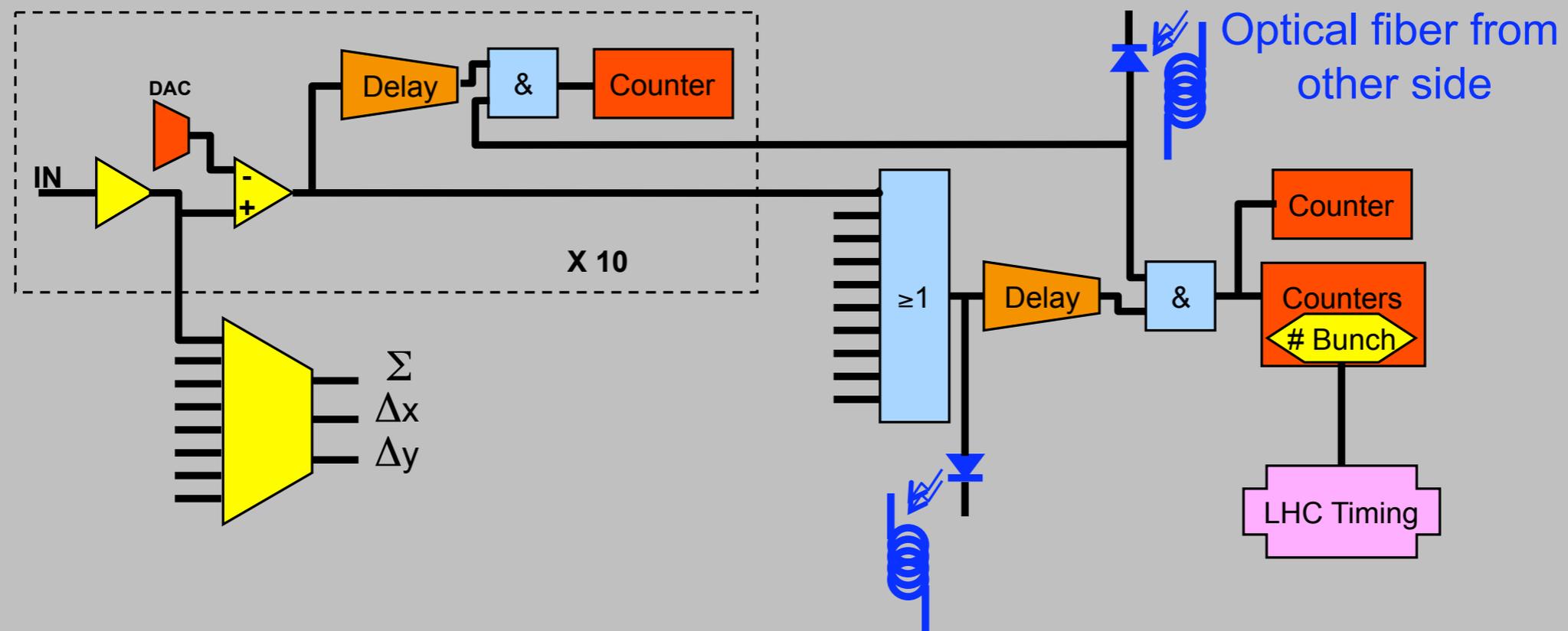
- Simple plastic scintillating pad connected to existing acquisition board (modified version of BRAN-B CdTe)
- Acquisition done in counting mode
- Use BRAN-B VME acquisition board with modified firmware
- Same board acquires both IP sides signal

BRAN-PMT layout



BRAN-B VME card

The BRAN Acquisition Board is the core of the acquisition



All logic and counters done inside the ALTERA Cyclone II FPGA

Berkeley's must do

- Clarify what will be available and when
- Deliver 4 FINAL chambers by the end of the year
- Deliver the full electronics chains by end of the year or beginning of new year
- Deliver specs for the DAB firmware immediately

CERN's must do

- FESA class for the control of the BRAN
- Application for the display of the measurements and the control of the scans
- Local support during the installation
- Take care of what LBNL declares out of their reach (if resources available)

Documentation

- LBNL should deliver all the documentation needed for the exploitation and maintenance of the system
 - drawings, manuals, etc.
- A clear and detailed description of the system is the first step and is absolutely needed for identifying the required documentation

Outlook

- Need to clarify the future of LBNL and LARP in the project
- Need to detail what will be delivered and when, LBNL and LARP must hard-commit to this plan
- CERN will make it's own plans based on these answers