What is the CLIC-ACM?

The ACM (Acquisition and Control Module) is a device providing timing, data acquisition and control signals to the TBM (Two Beam Module).

It must be an expandable system for hosting cards interfacing directly with TBM subsystems, must have redundant power supplies and optical communication interfaces to communicate with the Front End Computers (FECs).

Summary:
- 2 main beam linacs (1.5 TeV),
- 24 sectors per linac,
- 440 TBMs and ACMs per sector,
- 21000+ TBMs and ACMs in total,
- 50 Hz repetition rate.

The alcoves (radiation free zones) are places at the end of each sector (878 m apart) in the drive beam turnarounds. The FECs installed in each alcove will control the two nearest halves of the adjacent sectors.

Requirements and Constrains

There are multiple requirements and constrains for the CLIC ACM:
- power budget: 50 W / ACM,
- limited space,
- radiation (100–1000 Gy per year).

Currently over 300 channels have been requested:
- 28 Fast ADC (200 MS/s, 14 b),
- 55 Slow ADC (10 kS/s+, 16 b)
- 110 Raw DIO, 18 Serial IO (RS232/485),
- 24 Slow DAC (10 kS/s+, 16 b)

Total: 301 channels, 500+ including spare channels

Some of the channels are considered critical and the results from these channels must be available every cycle!

Proposed solution

Use of the GBTX chip for data, triggering and timing transfer:
- 3.2 Gb/s (40 channels, 80 Mb/s per ch),
- build in switch,
- radiation resistant 130 nm technology,
- clock recovery.

Redundant acquisition of the critical signals in multiple ACMs to reduce the machine downtime due to a missed beam permit.

Double Star topology for increased reliability:
- easier to maintain than Ring with 16 ACMs,
- only 25% more expensive than Ring with 16 ACMs,
- can work with the GBT.

Crate placement still to be decided.