

## New structures in NLCTA - signal processing

### Plan:

4 New structures are in fab for NLCTA, to be RF processed in parallel

Expect completed installation in March 2001

5th may be added pending upgrade of Sta 0

Structures will incorporate several new features and will be treated differently during processing

### Problem:

Each structure will have forward and reflected RF signals

Full I/Q or downmix is useful - 250 MHz analog BW; 1GS/s  
downmix requires excellent sampling synchronization

Each will have acoustic mechanical monitors

$n$  - 10 MHz BW

Each will have beam intensity monitors at each end (may be shared)

same as RF signals

Each will have a television monitor of light emitted inside its bore  
(may be shared)

video

Each will have scintillator/PMT radiation monitors - ADC/TDC

## Functional requirements

- Categorization and accumulation of statistics for each breakdown event
  - nominal pulses will be accounted through history buffers and selectively sampled through digitizer channels
- Ability to correlate successive breakdown events
  - ‘multi-pulse’ - 60 or 120 Hz
  - ‘spitfest’
  - following a long quiescent period
- Analysis of breakdown events
  - There appear to be several types - (apart from the correlations listed)
    - very strong; much missing energy
    - very weak; after the pulse
  - requirement for signal analysis
- Integrated collection - allowing connection of data from various sources
- External trigger

## Existing NLCTA signal acquisition tools

- VXI hardware HP E1428A / Veetest software
  - connected through GPIB
  - 6 each 2 channel units; also used for operation
  - 8000 pt record; 1GS/s; 250MHz BW; probably can read pulse sequences at 60Hz
  - Used for recording RE/FE I/Q
- CAMAC Transiac 2008 / virtual CAMAC software
  - 14 channels (one/module) with possibility of ~15 more
  - 8192 pt record; 20 MHz; external clock and post trigger
  - used for acoustic sensors
- CAMAC LRS 2249/2228 ADC/TDC / SCP buffered acquisition
  - 6 modules - 8 to 12 channels
  - used for scintillators; attempted use for beam I; RF signals
  - almost unlimited channel count

## Existing NLCTA signal acquisition tools (2)

- PCI Acqiris fast digitizer / PC NT Labview software
  - 4 channel very deep memory
  - several hundred points at 60 Hz
- Other scopes - TDS784; TDS540

## Total number of channels needed for 4 structures (varying lengths)

- 8 RF signals (I/Q or downmix)
- 5 beam intensity signals
  - total 13 (or 21)
- 30 acoustic sensors
- 10 to 20 scintillators
- 5 video devices