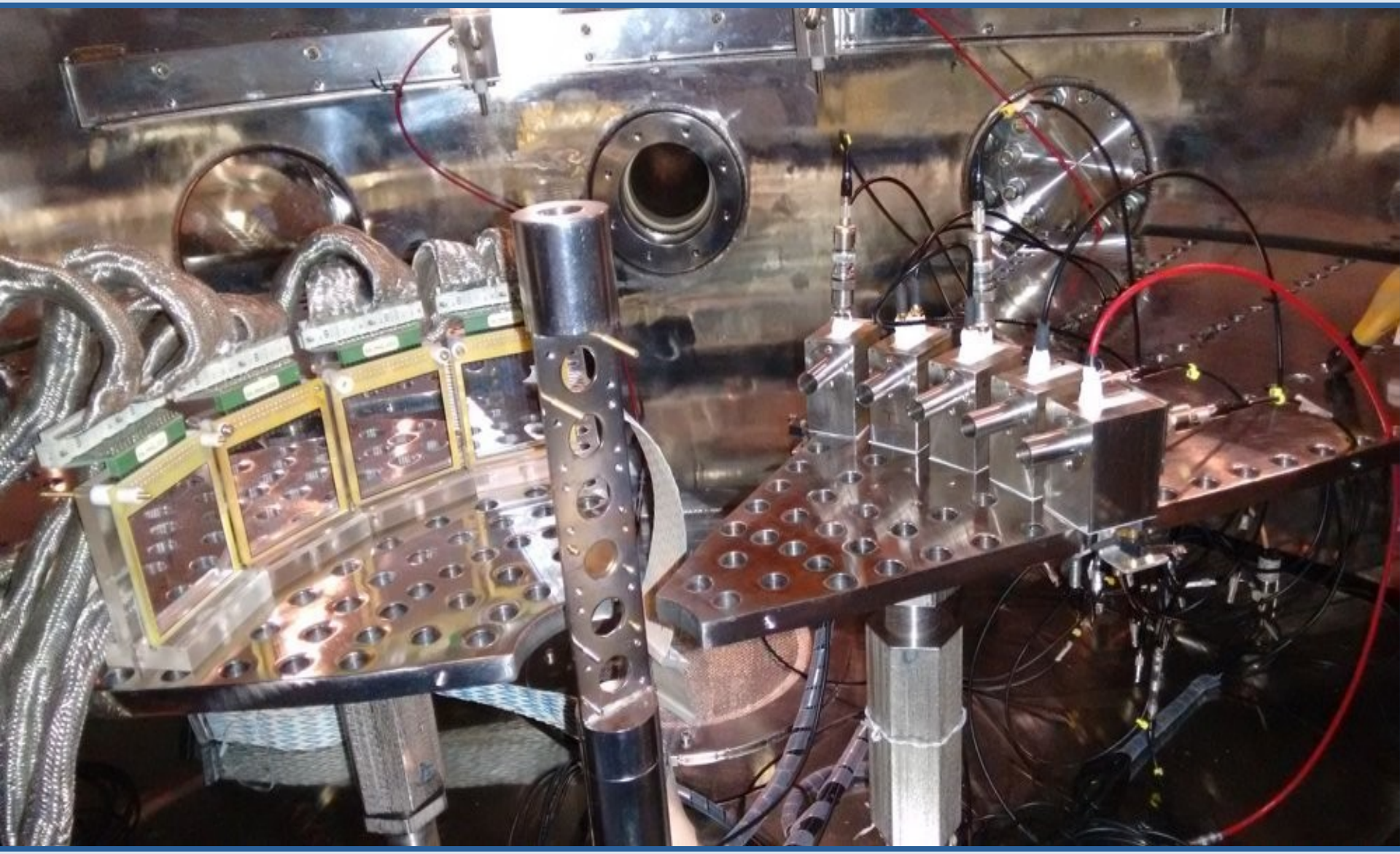
Accelerator Centres in India

- IUAC New Delhi
- BARC-TIFR Pelletron, Mumbai
- VECC Kolkata

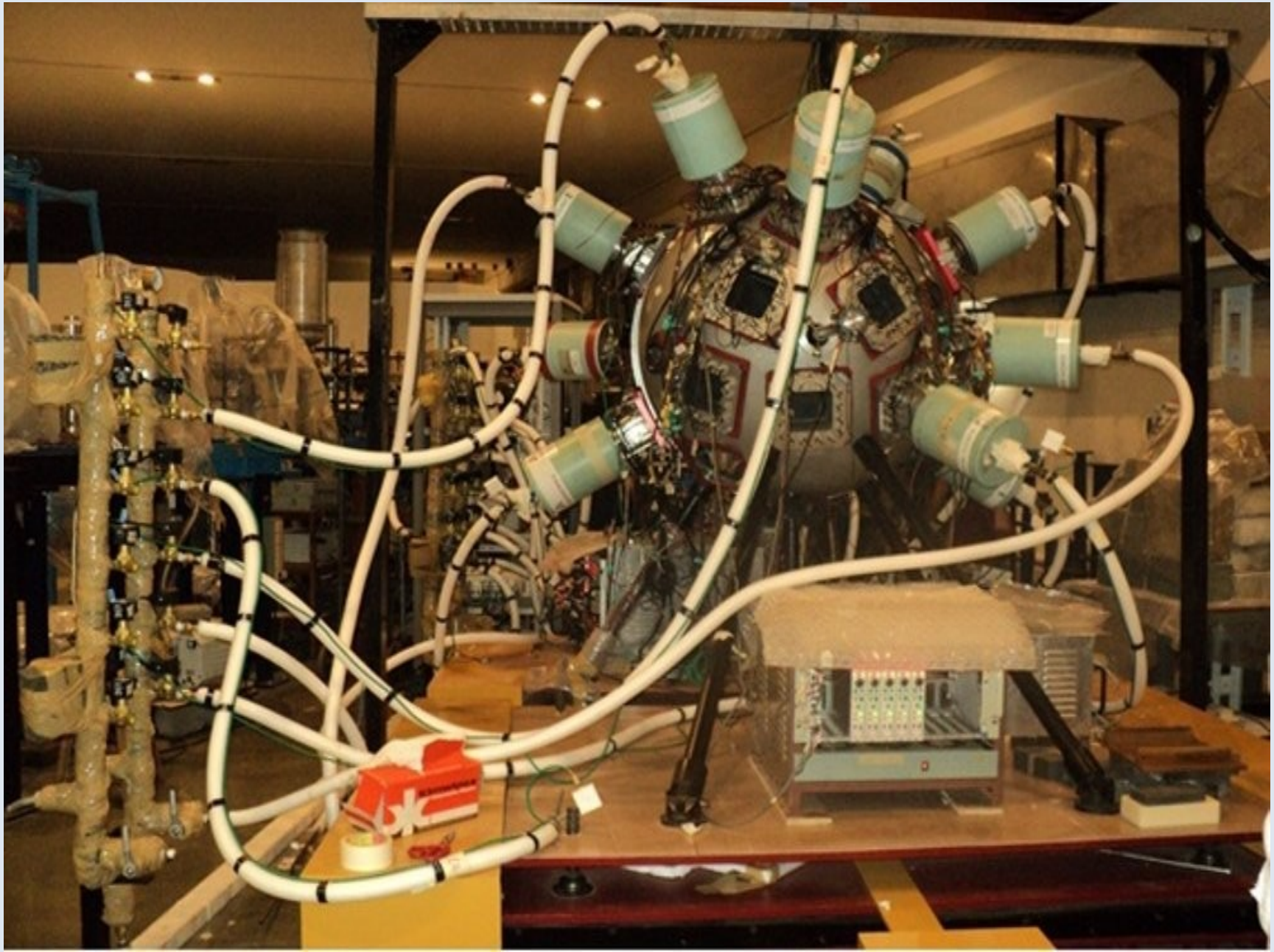
Some experimental setups shown in the next slides

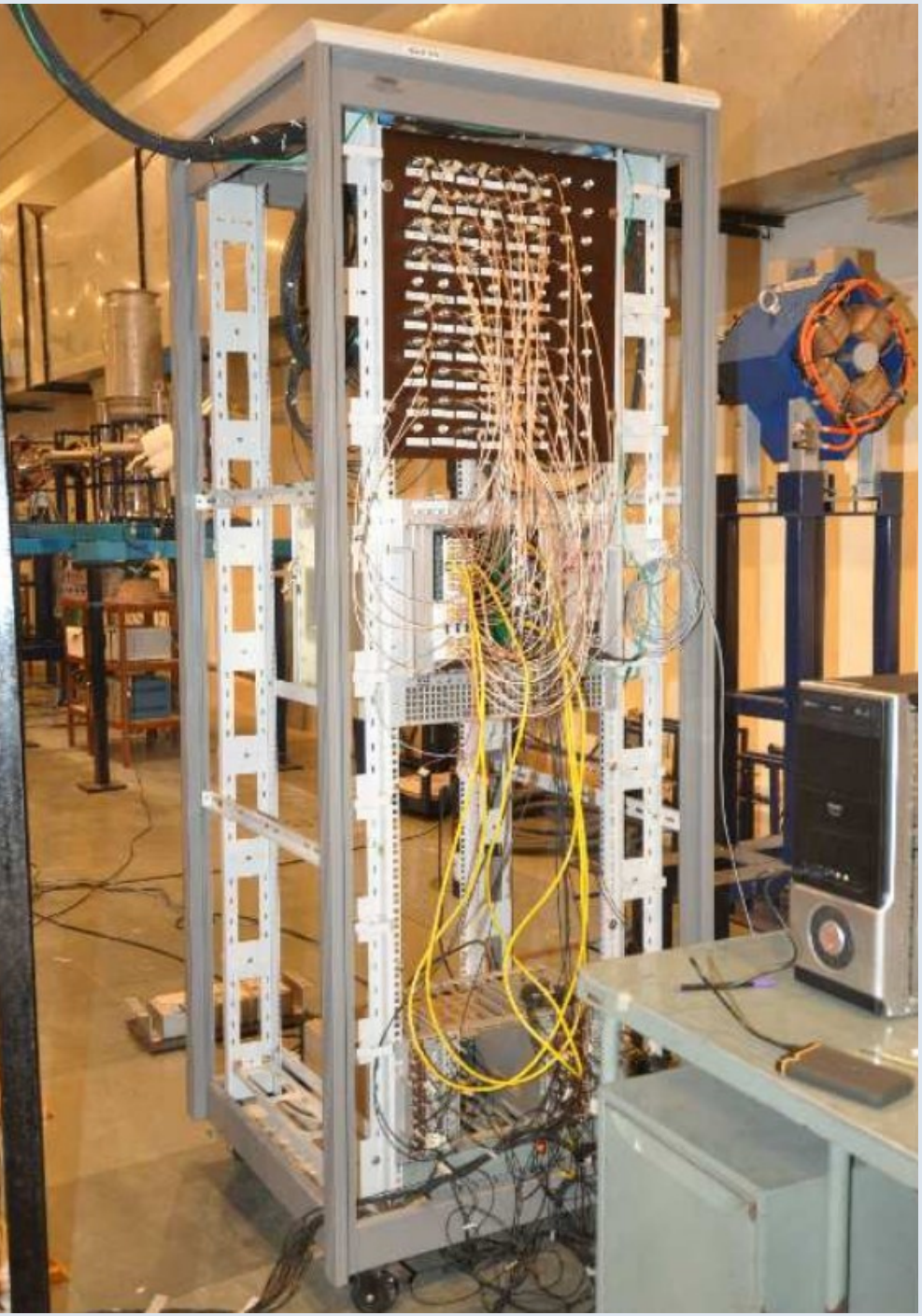
Scattering chamber BARC-TIFR

Scattering chamber BARC-TIFR Inside View



Gamma Detector Array (BARC-TIFR)

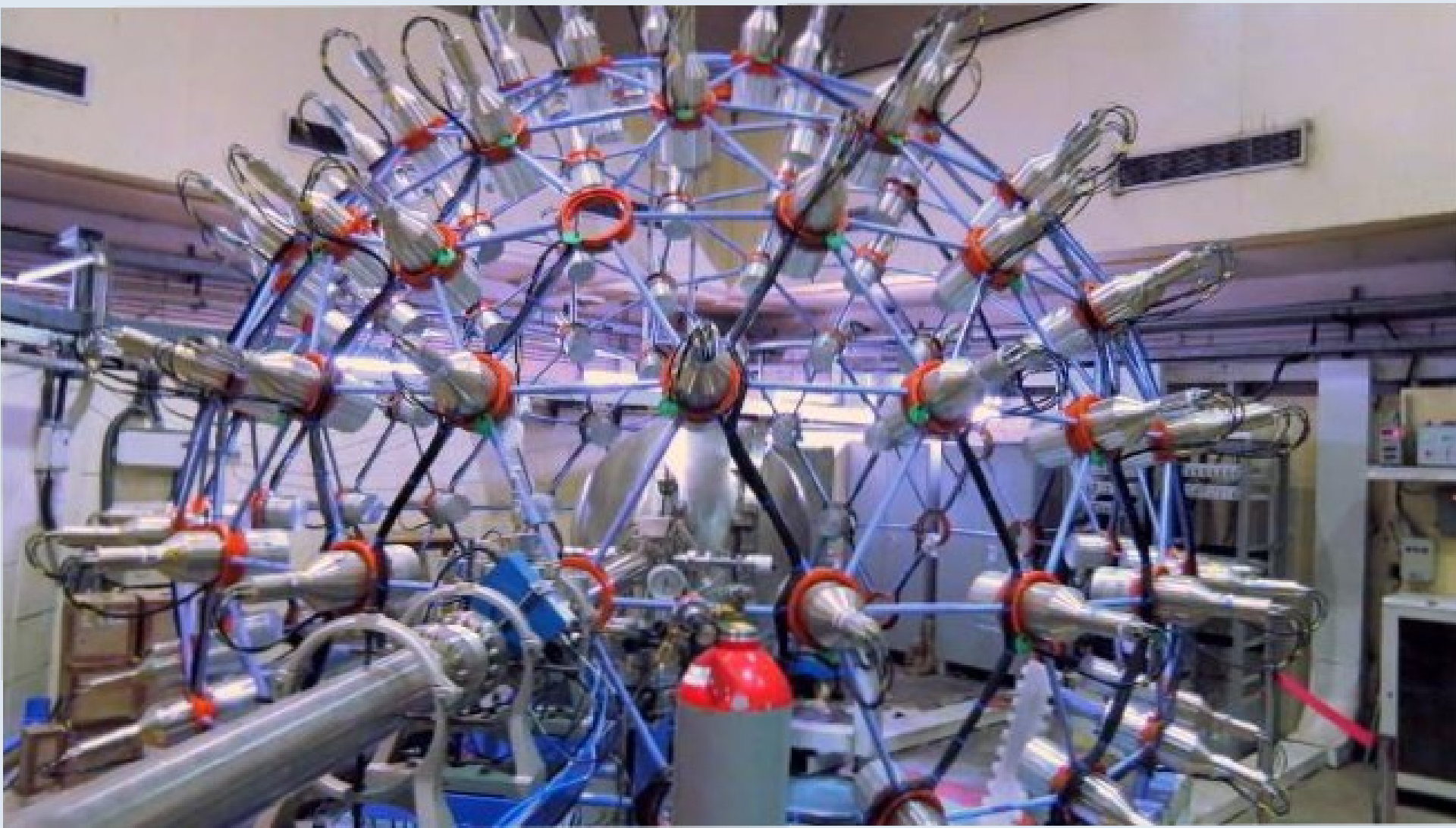




XIA System
PXI Digital DAQ at TIFR
24 Clover Detectors

NAND ARRAY AT IUAC

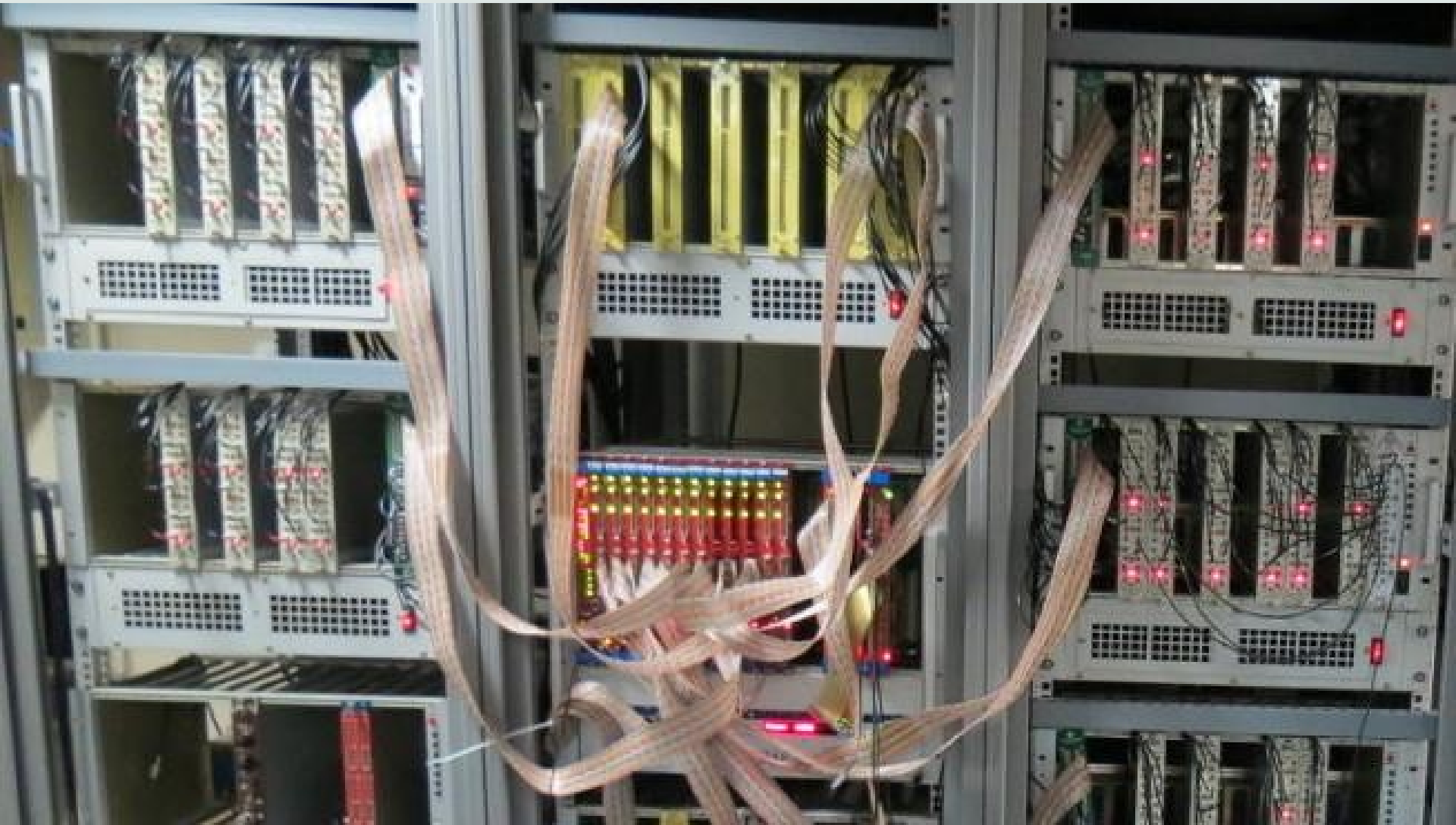
100 neutron detectors
TOF path 175 cm



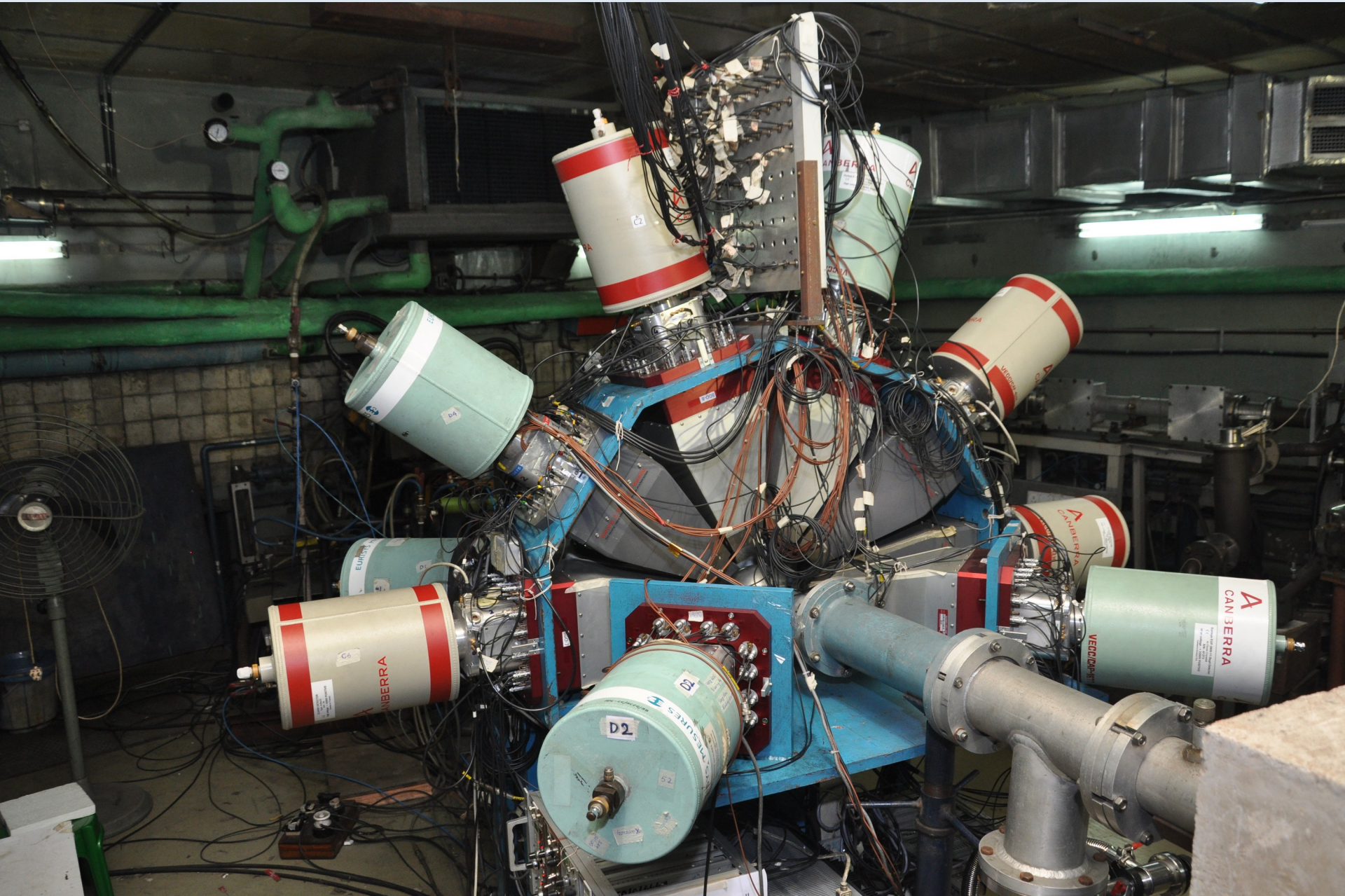
Fission detected in 2 MWPCs

VME Data Aquisition System at NAND

- LAMPS from 2009 to 2019
- 2019 onwards: ROSE-NIAS



INGA Clover Array Setup at VECC



XIA Digital DAQ with INGA at VECC

Inputs to CAMAC or VME DAQ

Amplifier outputs to ADC
PMT outputs to QDC
Timing outputs (common start/common stop configurations) to TDC
Master gate (Trigger) to all modules
Gate blocking to all modules (in VME, sometimes in CAMAC)

Inputs to Digital DAQ

Preamplifier outputs only (no amplifiers)
Can be triggerless
Gates can be used

DAQ Systems in India

CAMAC

Controllers: BARC, IUAC, CMC-100, Kinetic
Modules: BARC, IUAC, ORTEC, CAEN, LeCroy, Phillips
CANDLE, FREEDOM at IUAC
LAMPS at BARC-TIFR (in use also at IUAC and VECC)
CAMACDAQ at VECC

VME

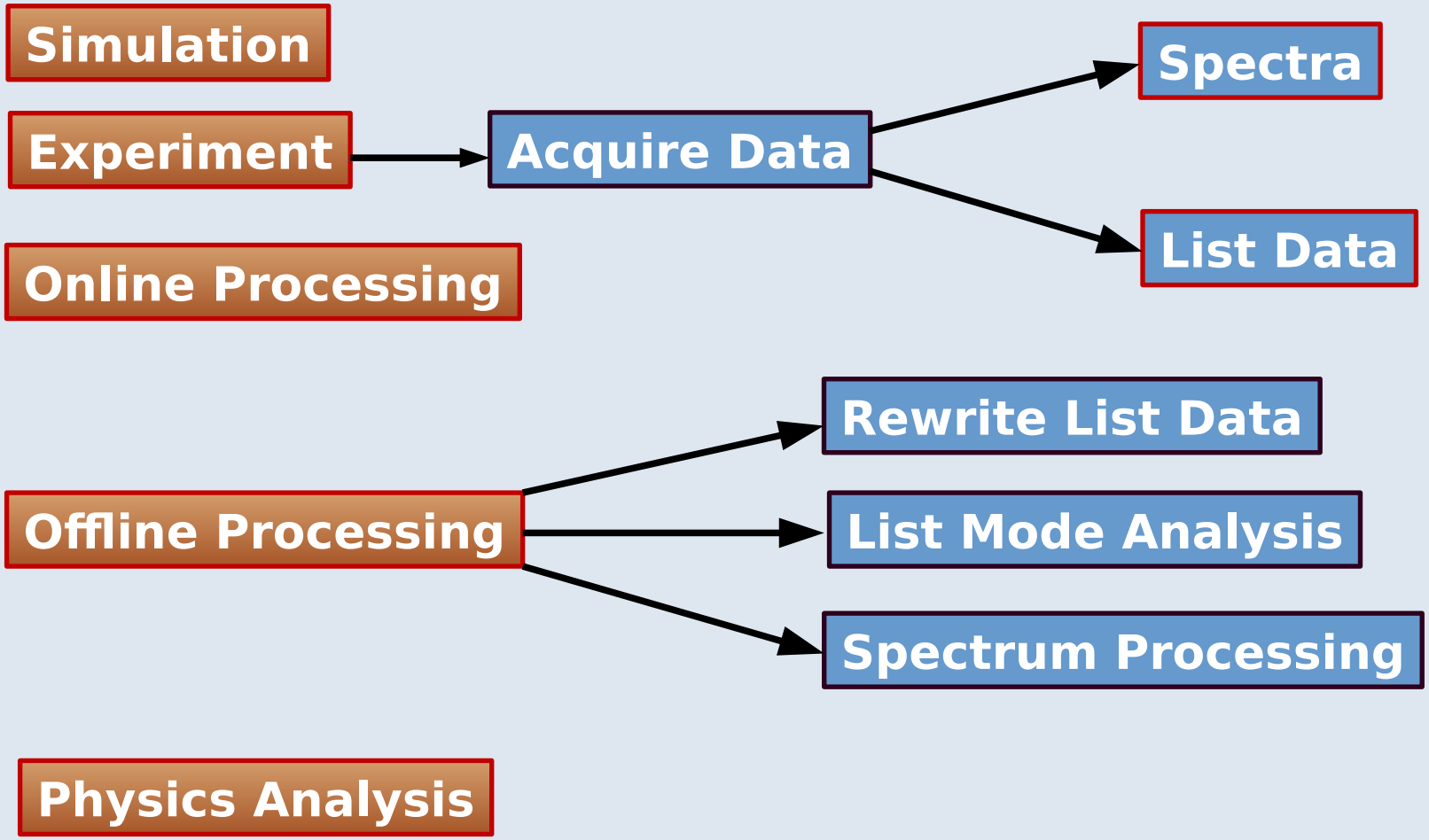
VMEDAQ at VECC Kolkata first VME system in India (around 2008)
LAMPS_VME at BARC-TIFR and NAND-IUAC (around 2010)
ROSE-NIAS at IUAC (2019)

DIGITAL

XIA System at TIFR (around 2010)
CAEN Digital systems:
Tabletop digitisers
VME Module digitizers
CoMPASS: Multiparametric DAQ Software for Physics Applications

Data Acquisition for Physics

Hardware and software to record and process data in experiments



Hardare for Analog DAQ

Crate: CAMAC, VME
Multi-crate distributed systems
Modules: ADC, TDC, QDC, Scaler
Controller
Link and PC Interface

CAMAC system

The controller is the right most module

Addressing scheme is N,A,F

1 μ s/word

VME – Versa Module Euro card
200 ns/word

VME master

Optical Link

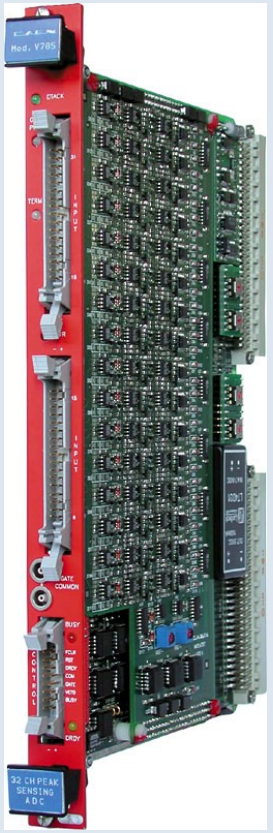
power supply

VME Crate

backplane

smart fan units

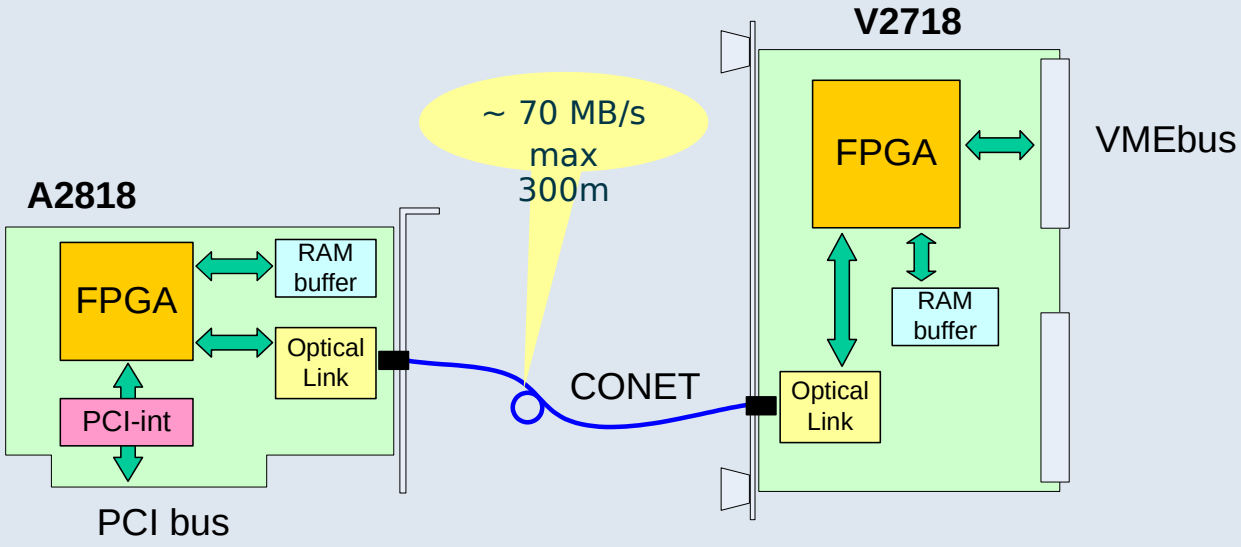
VME slave



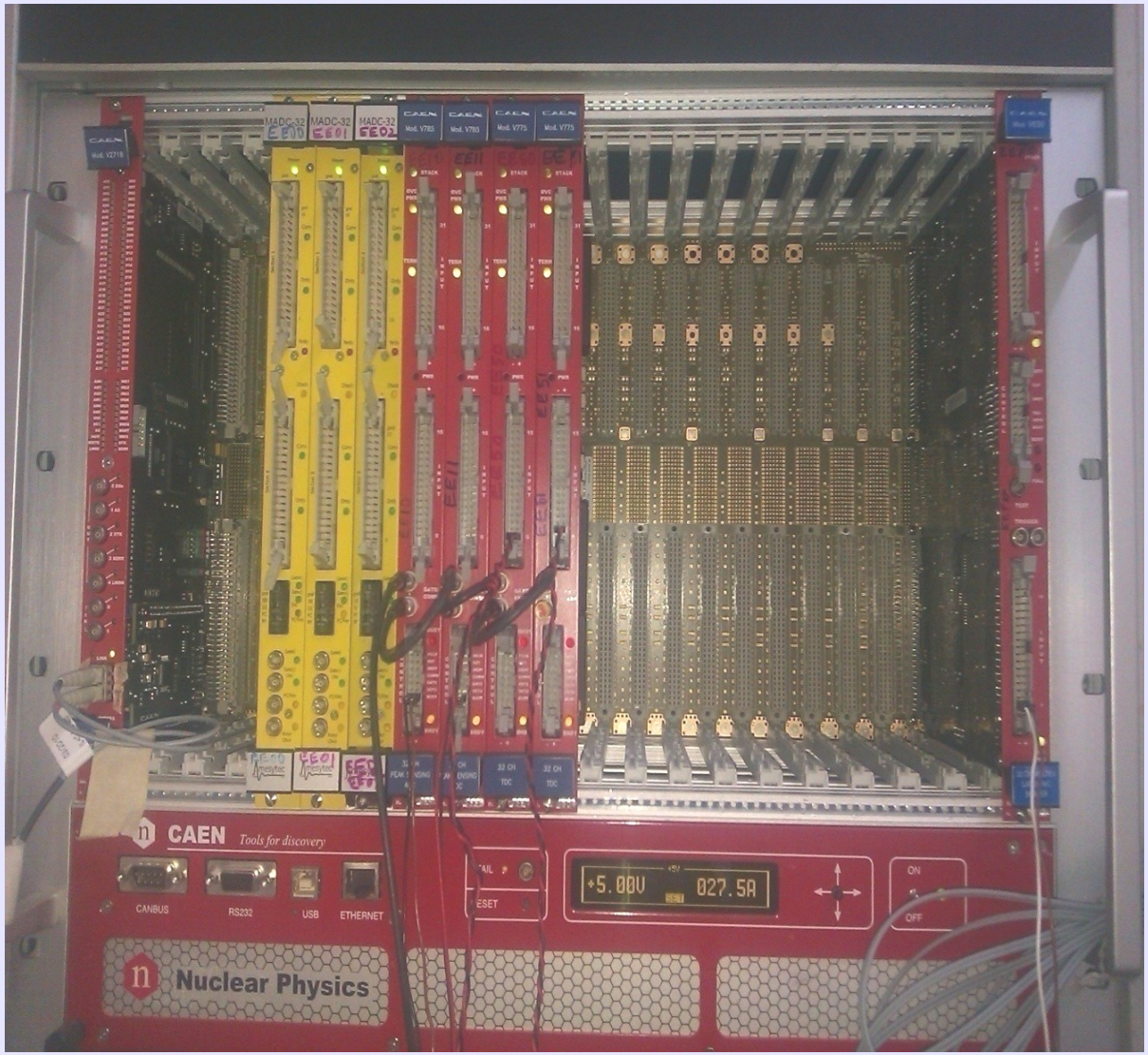
ADC, TDC, QDC, Scaler

VME Controller – V2718

- Max throughput rate: 70MB/s
- VME64/VME64X (no 2eSST)
- PCI 32bit, 33MHz
- Optical Link: 1.25 Gb/s
- Max distance: 300m



Operational Aspects



- Controller should be inserted in slot 1 of the VME Crate.
- While setting up the CBLT Chain, the modules forming the chain should be contiguous; last module should be terminated with a 50 Ohm resistance.
- Scalers can be inserted in any empty slot.
- MesyTec ADCs, if used along with CAEN Modules, should be inserted first in the chain.
- Master Gate blocking from busy of modules

New at IUAC (2019): In-house built VME Controller
Software system: MARS ROSE-NIAS
Available in all the experimental setups
Replacing the still available CAMAC setups

DIGITAL DAQ

Digital DAQ systems: XIA: TIFR Mumbai and Kolkata
CAEN Digitiser with COMPASS software
MESYTEC Digitizer VME Modules

Characteristics of a DAQ

Speed, Dead Time, Throughput

Measurement of DAQ speed

- Random events
- Sparsity considerations

Facilities provided in software:

Processing, Remote access, Analysis

Acquisition and Analysis Programs

LAMPS (CAMAC-several versions, VME, Offline)
FREEDOM, CANDLE (CAMAC, Analysis)
CamacDaq, VmeDaq, VECSORT
INGASORT (Analysis)
RADWARE (Analysis)
ROOT (Analysis)
GEANT (Simulation)

Programming

C, C++, Fortran
ROOT: Command line, Macro, C++ programs

Common operations on data

Histograms h1, h2
Gate conditions
Graphical cut (Bgate)
Pseudo parameters
Peak fitting
Re-writing of data