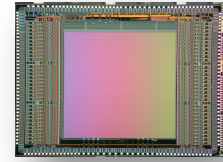




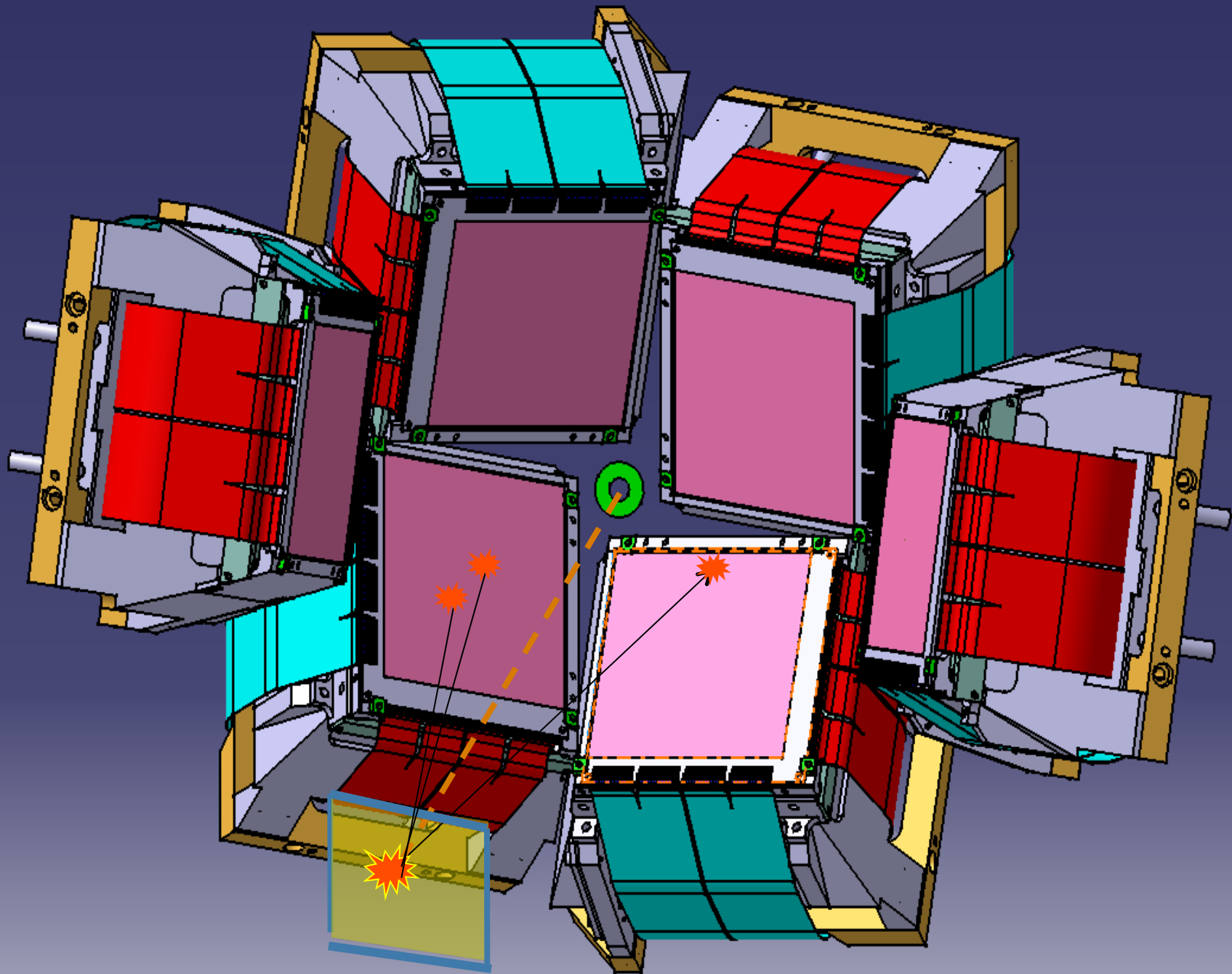
# Beyond 2015 after 15years of launching the program

Lolly Pollacco

# MUST2

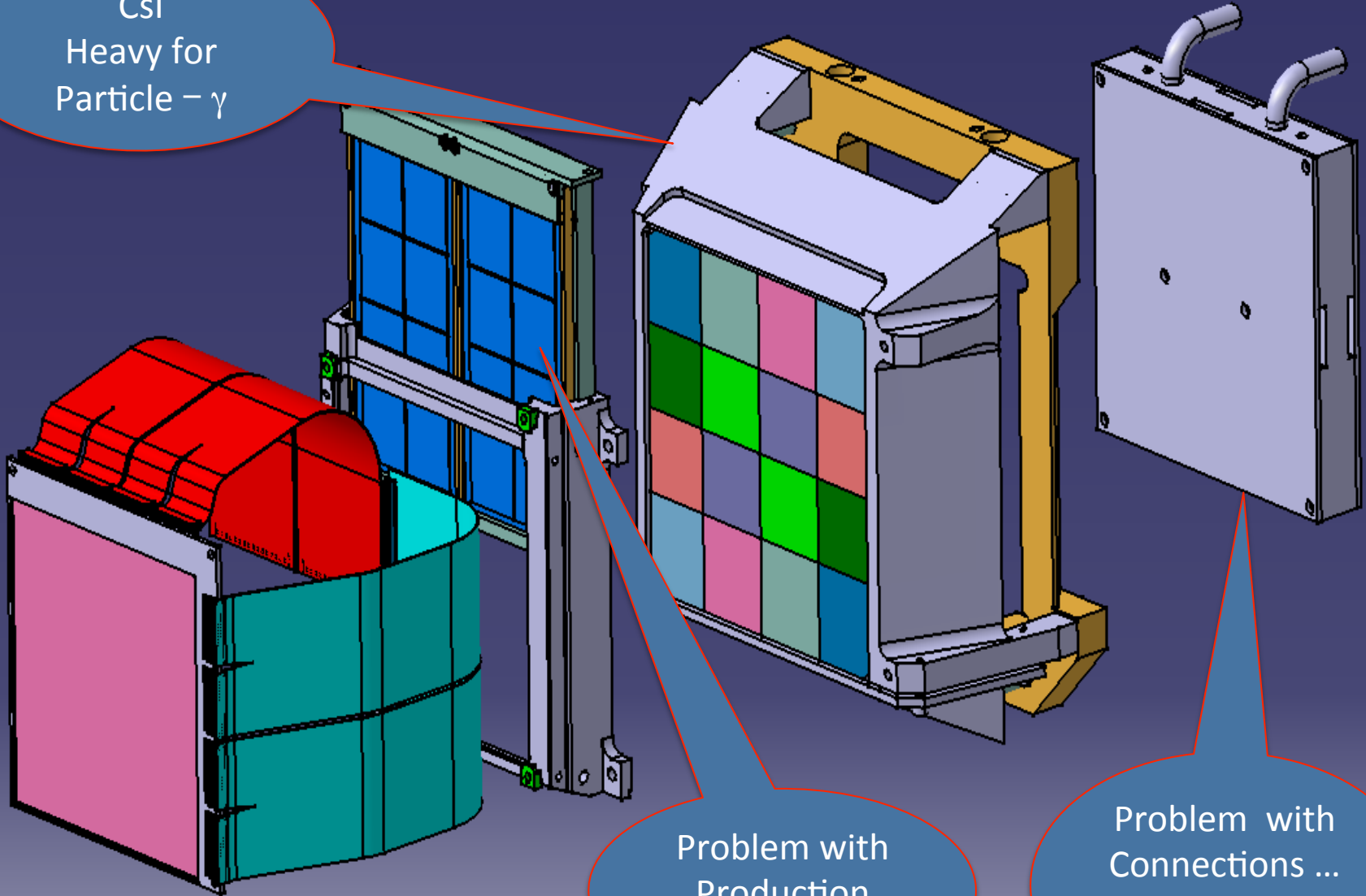


- An adventure in year 2000 - GANIL, IPNO & SPhN
  - WHY?
    - Fear of the unknown, EM, Radiation Damage, Complexity, ..., leaving old techniques (screw drivers NIM, CAMAC ...).
  - Today more than 20 MUST2 exp performed
  - Difficulty due to Gamma-Particle (MUST2 is too heavy)



Two body & Multi-Body final state – 1kHz, 50keV, 0.3°, ...

CsI  
Heavy for  
Particle -  $\gamma$



Problem with  
Production  
Si(Li) ...€

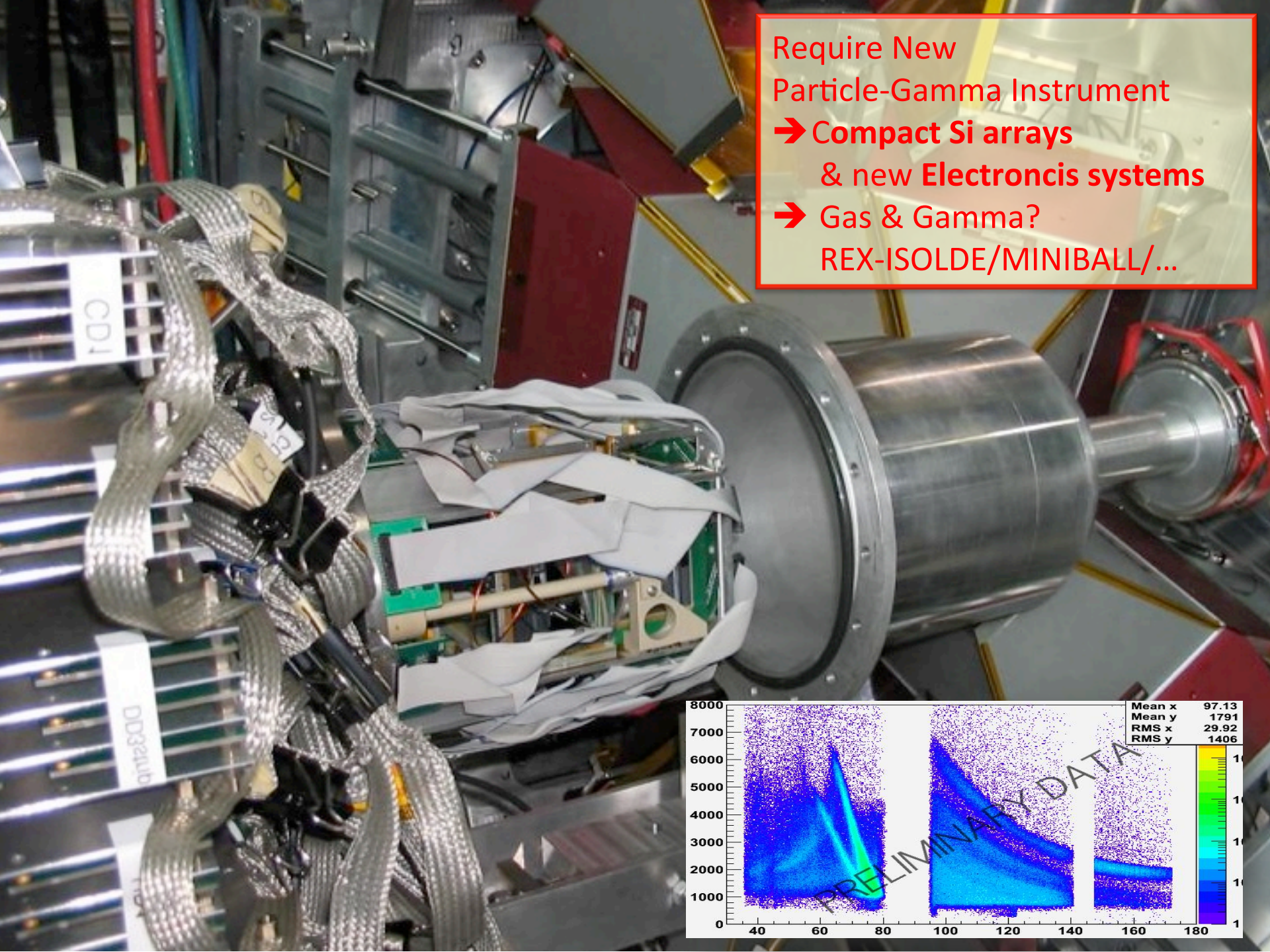
Problem with  
Connections ...  
Missing eng.  
Support

Two body & Multi-Body final state - 1kHz, 50keV, 0.3°, ...

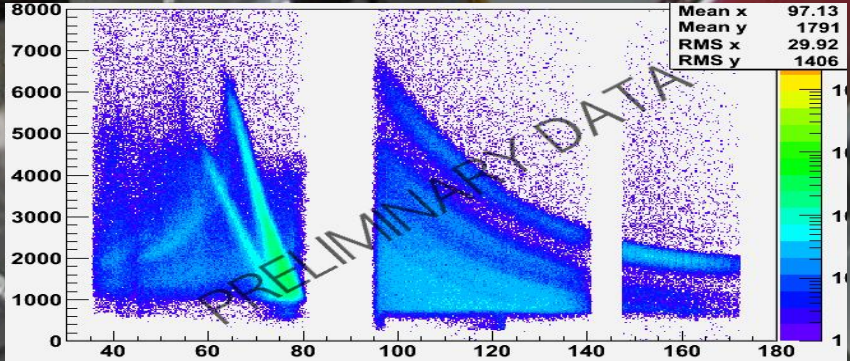
# MUST2 → Beyond & WHY?

- MUST2 is now 15years old in its conception.
  - Need to review the hardware before MUST2 dies
  - Need more modern Firmware/Software
- MUGAST has no or not enough electronics
- ISOLDE – a good cheap & effective sol<sup>n</sup>
  - *Towards having a entrance ticket into ISOLDE*
- GASPARD – maybe a partial sol<sup>n</sup>

*The present discussion assumes that MATE is still a generic chip worth investing in.*



Require New  
Particle-Gamma Instrument  
→ Compact Si arrays  
& new Electronics systems  
→ Gas & Gamma?  
REX-ISOLDE/MINIBALL/...



# MUST2 → Beyond & WHY?

- MUST2 is now 15years old in its conception
- MUGAST has no or not enough electronics
- ISOLDE – a good cheap & effective sol<sup>n</sup>
  - *Towards having a entrance ticket into ISOLDE*
- GASPARD – maybe a partial sol<sup>n</sup> ... + 4 years

*The present discussion assumes that MATE is still a generic chip worth investing in.*

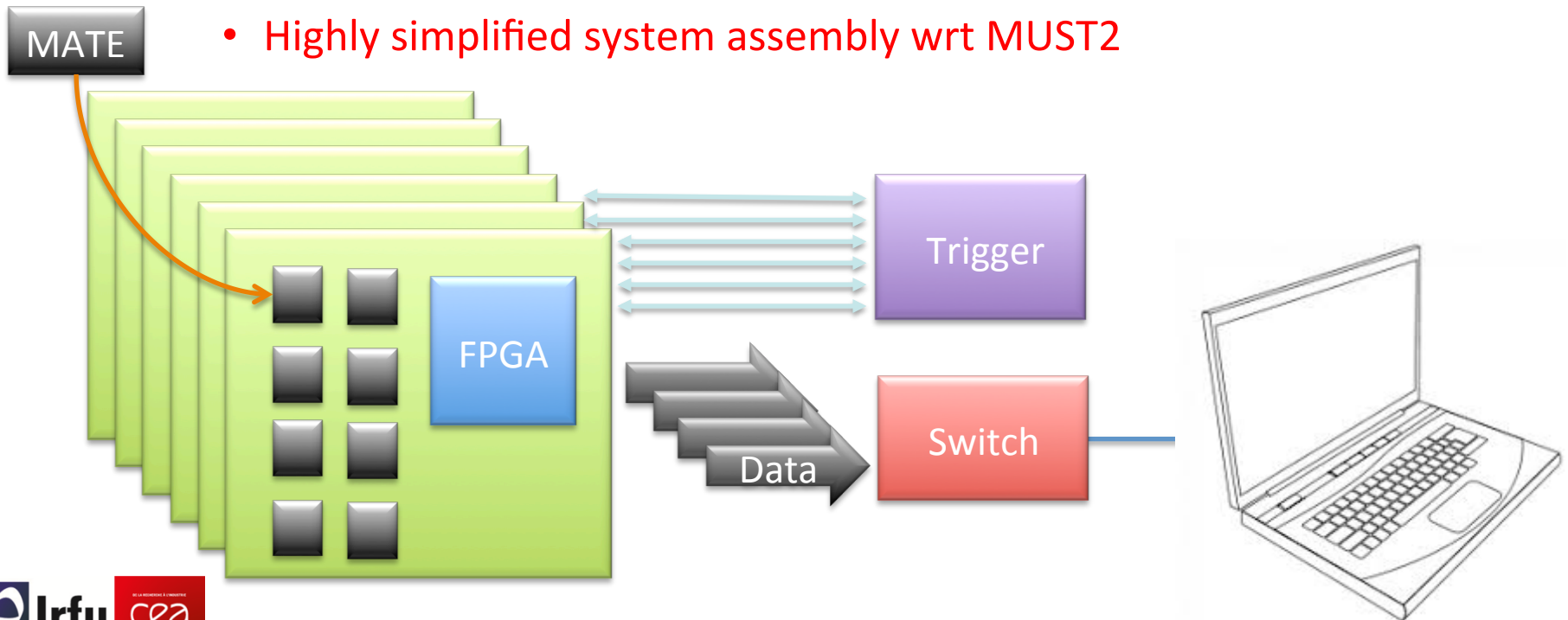
# AUST2 instrument re-seen today

- MATE – still good in its performance
  - PA & AMP performance
    - ie can be Improved → dyn range
  - Multiplexing is every 500ns ie  $500\text{ns} \times 2 \times 16 = 16\mu\text{s}$ 
    - ie can be 2MHz → 25Mhz ie  $16\mu\text{s} \rightarrow 1.2\mu\text{s}$  (Faster system)
    - → 2XADCs/channel ie 128 ADC/Chip 12-13bits (extra-Fast system)
  - Readout
    - Serial Readout → Selective readout
  - Coupling
    - Time-Stamp/Chip → Time-Stamp/Channel
- ADC 2MHz
  - ADC could be included with a MATE/channel
    - Simplified Chip-Card (MUVI-like), Improved S/N → Dyn Rnge
    - Multi-sampling of the multiplexing → Dyn Rnge



# AUST2 instrument re-seen today'

- Chip-Card ( X & Y cards + MUVI )
  - **Last generation FPGA (Replaces MUVI, VME, Data-Transfer)**
    - Zero suppression, Data Formating, local trigger, Time-stamp, ...
    - Simplified Trigger
    - Highly simplified system assembly wrt MUST2



# Needs

- Re-build the necessary software for calibration
- Parameter Control
- Runs control

# Requirements – MUGAST/ ...

- GASPARD\_Proto & TRACE & MUST2 = MUGAST
- > 1kHz rate if possible
- Integration of AGATA & ExoGam & MUST2 & TRACE
  - Time stamp/telescope
    - if possible
    - or common DT
- Telescopes
  - DSSSD + *Si(PAD)* + *Si(PAD)*
- DSSSD GASPARD/TRACE proto-type
  - 500 microns
  - 128x + 128y
  - Energy/channel
    - 25keV (electronics) FWHM
  - Time/channel
    - 1nsec FWHM

# Requirements - /MUGAST bis

- Si(Pad) GASPARD/TRACE Prototype
  - N pads
  - Energy & Time as for DSSSD

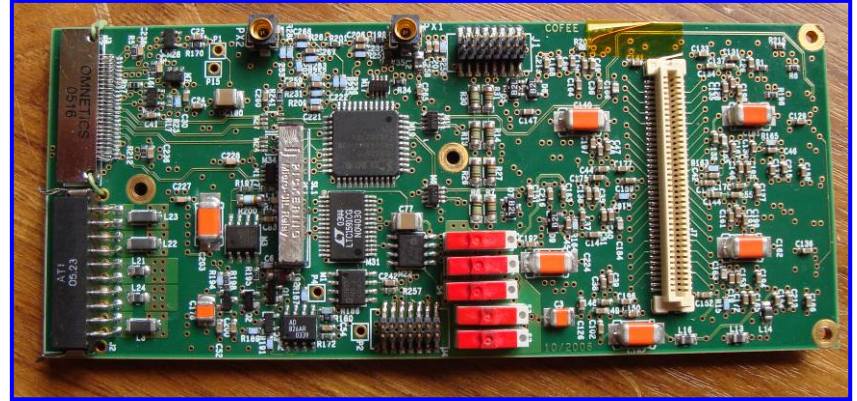
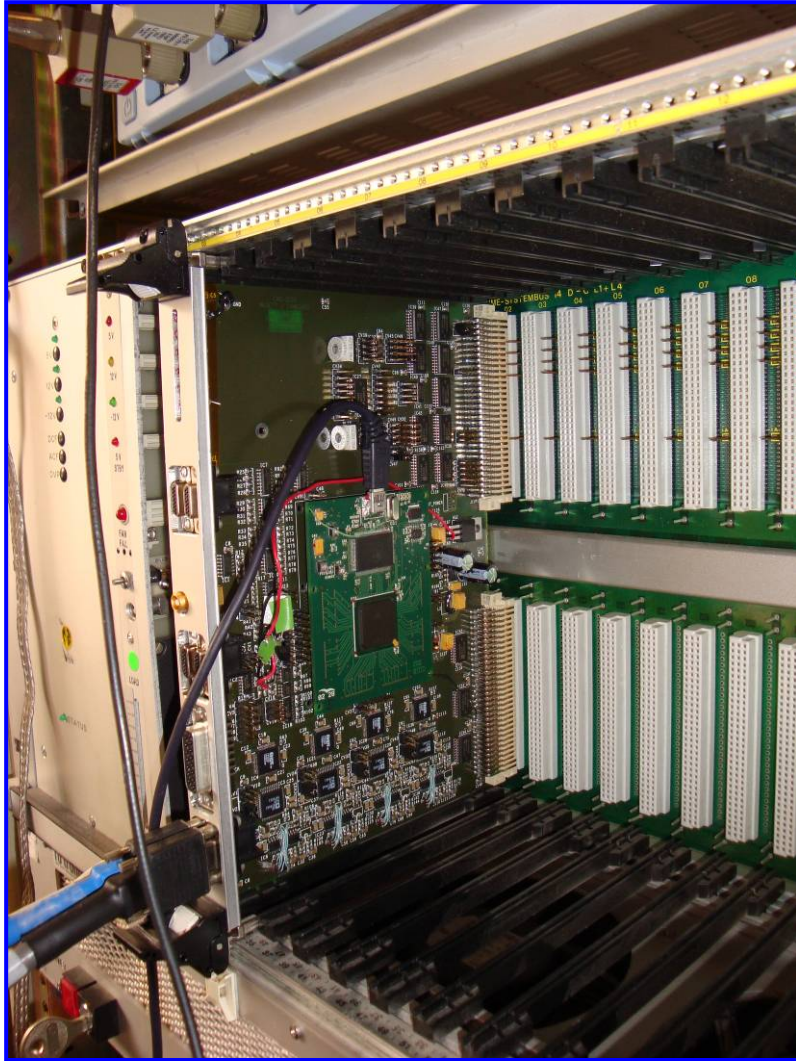
# Available Choices For an Acquisitions

1. Repair/Assemble MUST2 front-end

① Do not know status

2. MUsETTE system – COFEE<sub>x5</sub>+MU<sub>VI</sub>+VXI

①  $64 \text{ ch}_{x5} = 128x + 128y + 64(\text{PAD})$



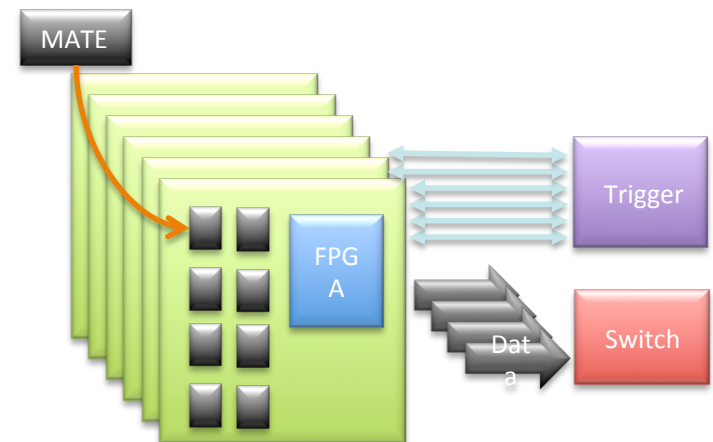
# Available Choices For an Acquisitions

1. Repair/Assemble MUST2 front-end
  - ① Do not know status
2. MUSERTE system – COFEE<sub>x5</sub>+MUVI+VXI
  - ①  $64 \text{ chx5} = 128x + 128y + 64(\text{PAD})$
  - ② IPNO to Build & Test cards
  - ③ Use of MUSERTE firmware/firmware
  - ④ Borrow the modified MUVI – if there is enough.

# Available Choices For an Acquisitions

## 3. Build a *new* Chip-Card

- ① MATE or ATHED chips
- ② Pulser, ADC, FPGA, Power
- ③ Fiber(data) & Cu(Trigger) out signals
- ④ Temperature & Current Monitoring
- ⑤  $128+16 = 128x + 128y + 16(\text{PAD})$
- ⑥ CENBG+IRFU+IPNO ? labs to build:-  
Hardware, Soft & Hardware

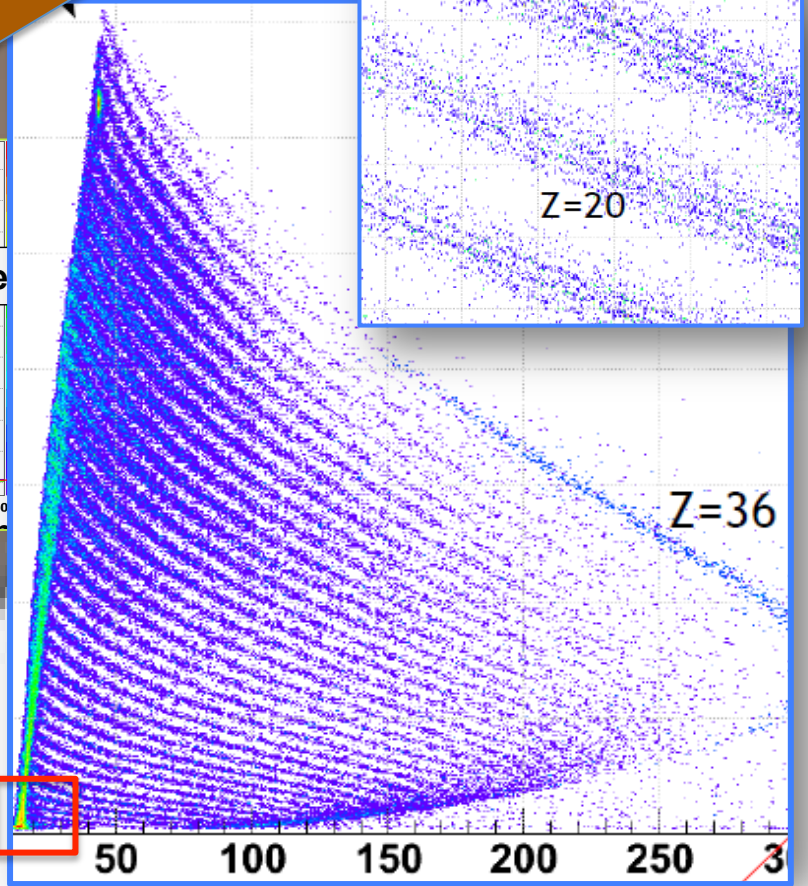
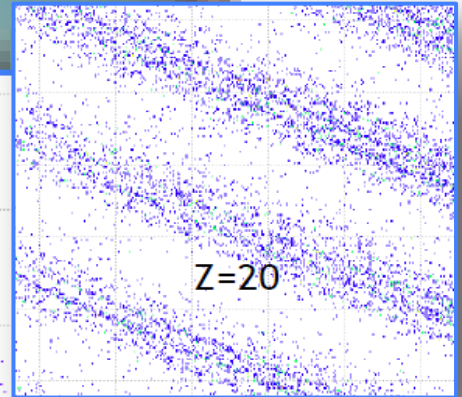
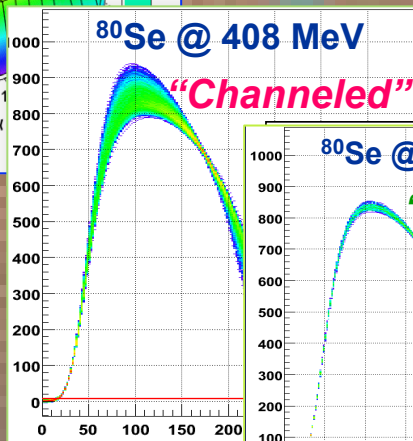
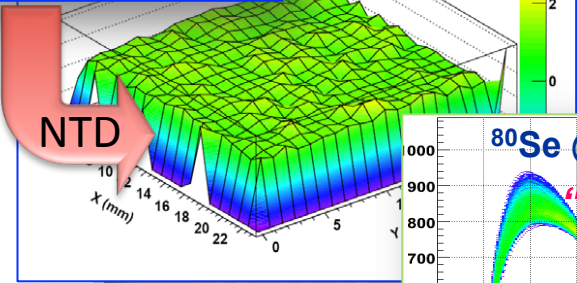
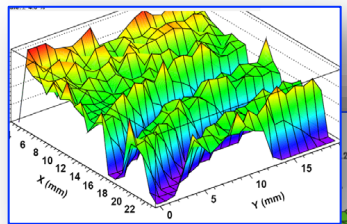




# FAZIA – Option for ISOLDE/GANIL- Beam

Resistivity Uniformed

Channeled



- Challenges/Applications:-**
- .Single crystal telescope
    - Si Thickness, max Z, hardness ?
  - .What Electronics?
  - .Adopt as a “Zero deg. Spectrometer”

# MUST2 & Beyond

- MUGAST – what should be the soln if the project is supported?
- MUST2 at ISOLDE – Gamma Transparency