

The DIAMANT array

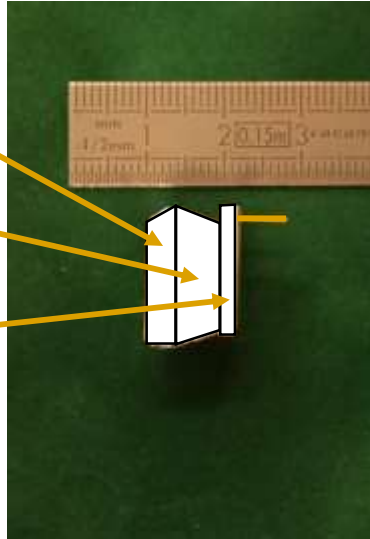
István Kuti

B.M. Nyakó, K. Szitha, M. Varga, Zs. Dombrádi, Gy. Hegyesi, J. Molnár
Institute for Nuclear Research



CsI detectors

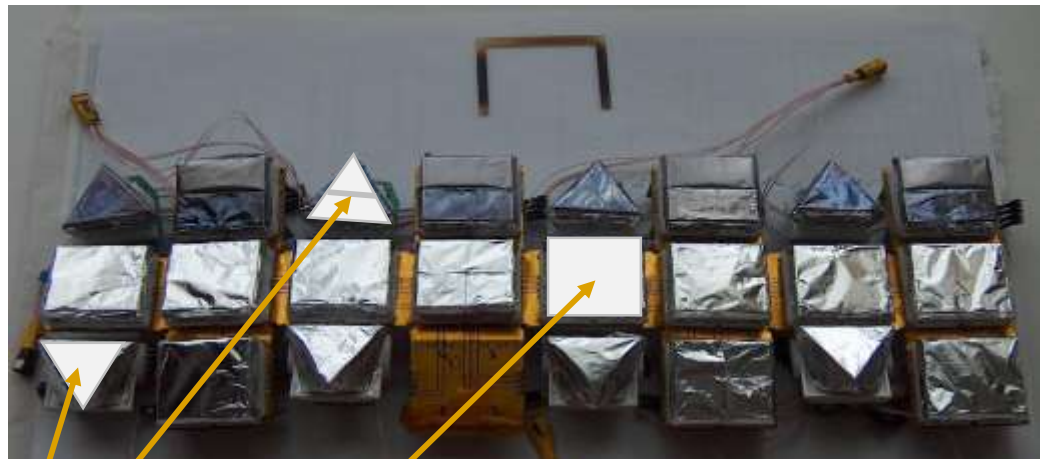
- $d(\text{CsI}) = 3 \text{ mm}$
 - $E_{\text{proton}} \leq 25 \text{ MeV}$
 - $E_{\text{alpha}} \leq 100 \text{ MeV}$
- Plexi-glass light-guide
- special wrapping
80% light collection eff.
- PIN-photodiode
- Efficiency [% of 4π]:
 - geometrical ≈ 90
 - det. protons ≈ 70
 - det. alphas ≈ 50



The folded array



- Used in many experiments



Single/dual triangular and quad CsI detectors (with Ta absorbers) on FlexiBoard



CsI(Tl) has an intrinsic particle discrimination capability.

Different methods for PID.

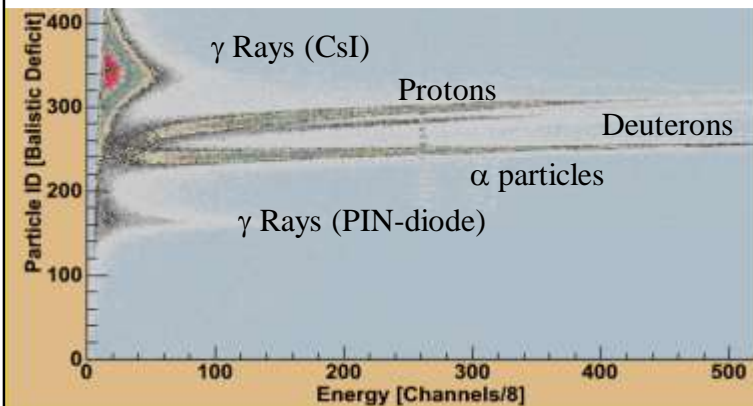
talk by B. Nyakó

Setting gates on charged particle spectra enables:

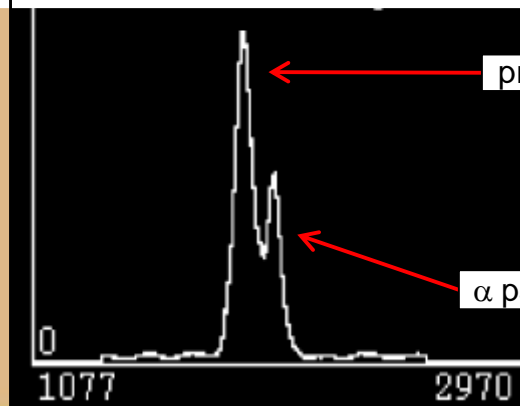
The DIAMANT electronics realised in VXI standard (designed in Atomki)

- selection/rejection of reaction channels
- rejection of random events
- enhancement of gammas with special conditions

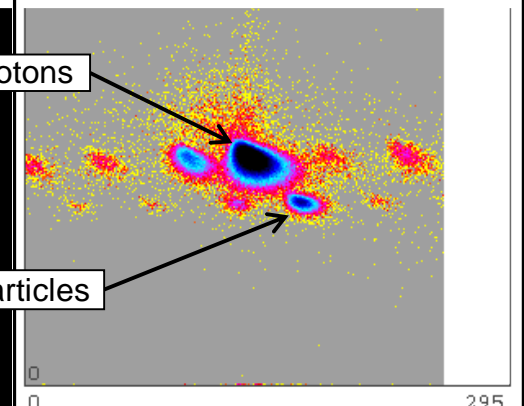
Example PID-E spectrum



Time spectrum



PID-Time spectrum





CsI(Tl) has an intrinsic particle discrimination capability, based on:

$$\tau_{\alpha} \neq \tau_p \neq \tau_{\gamma}$$

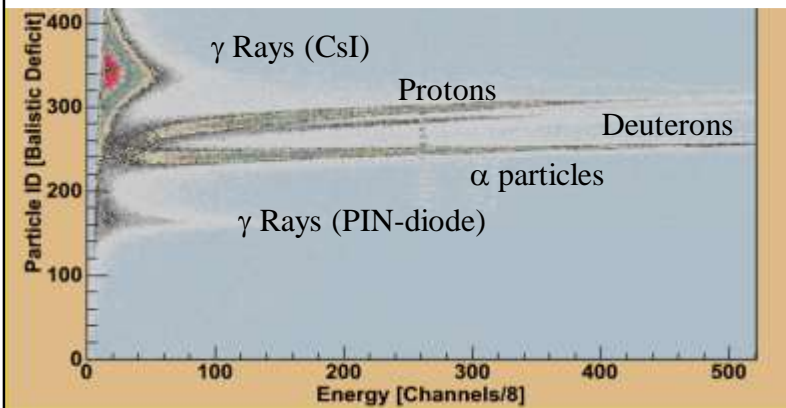
Ballistic Deficit, the Zero Crossing or mixed methods for PID.

Setting gates on charged particle spectra in 1D (Time, PID) or 2D (PID-E, PID-Time, Time-E) enables:

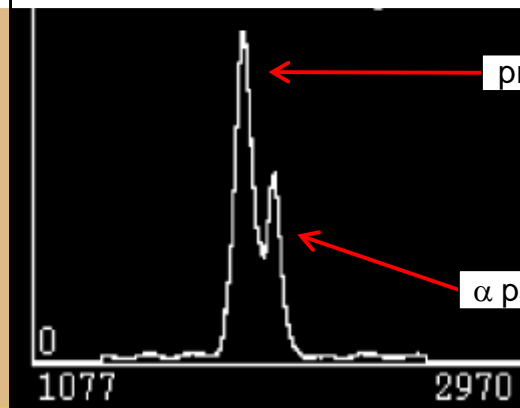
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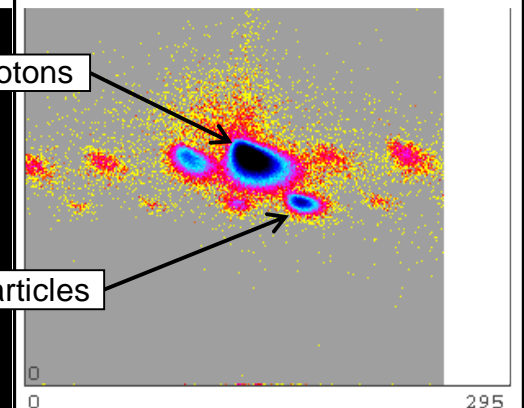
Example PID-E spectrum



Time spectrum

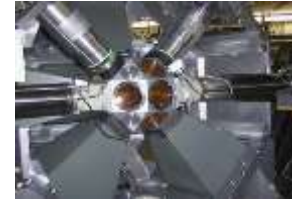
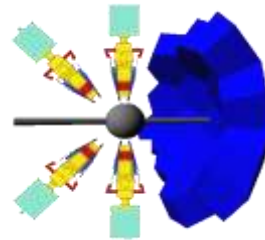
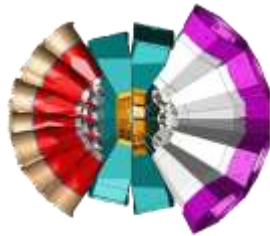


PID-Time spectrum



DIAMANT

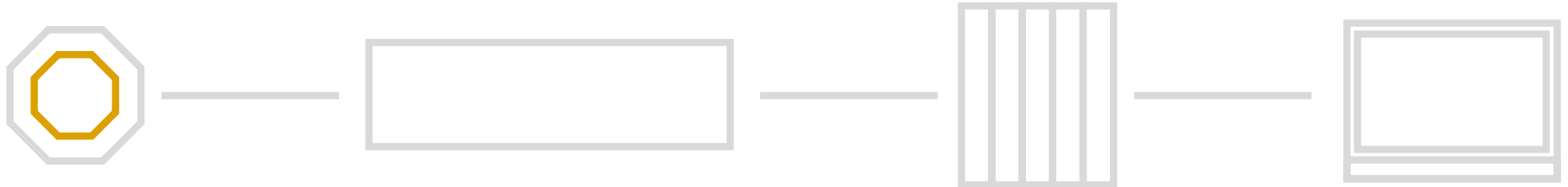
DIAMANT has been used in many experiments:



Known problems:

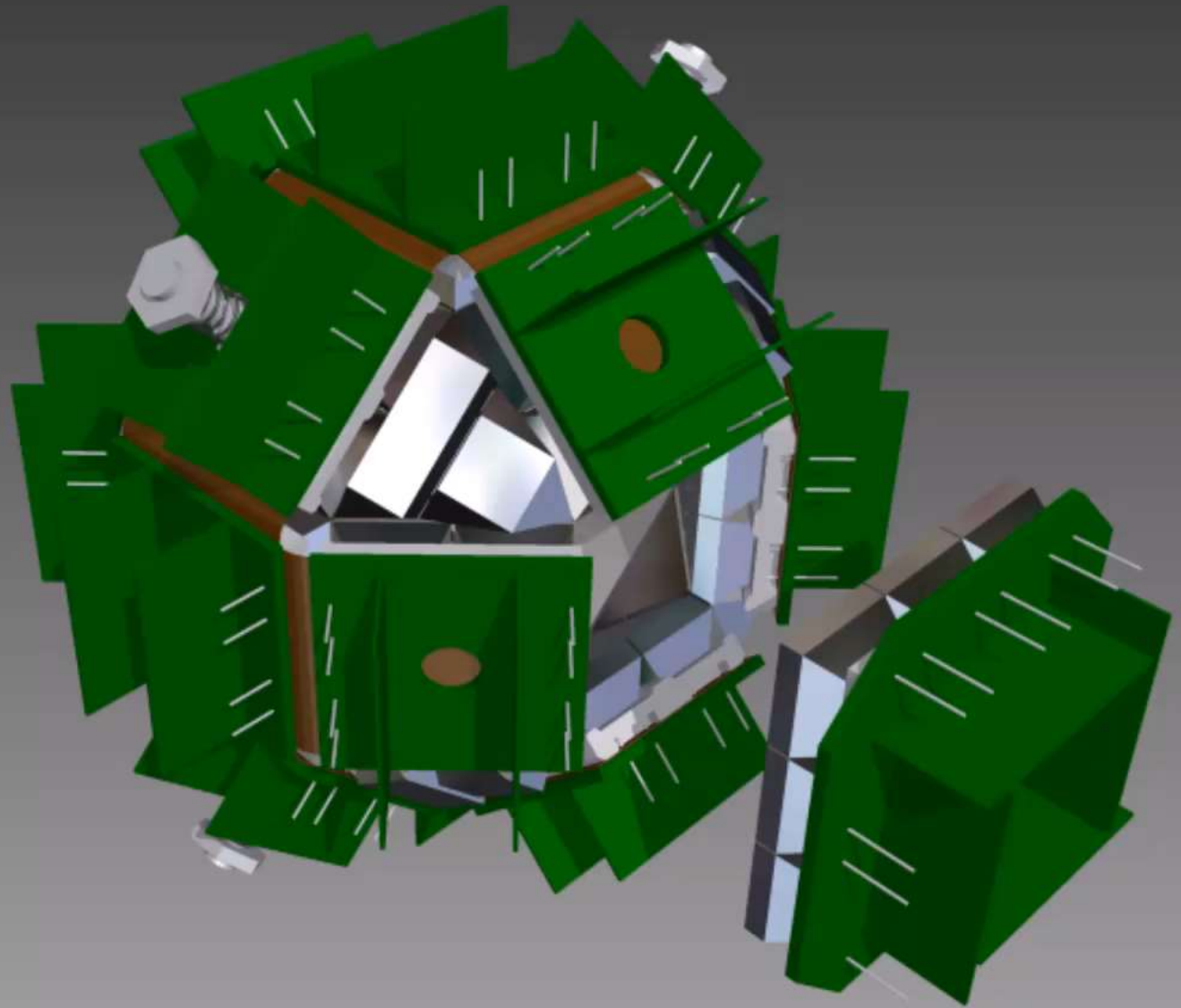


- no access to ForwardWall (FWW)
- inner cabling hardly manageable
- too tight arrangement
- vulnerable preamps
- etc...
- analog electronics

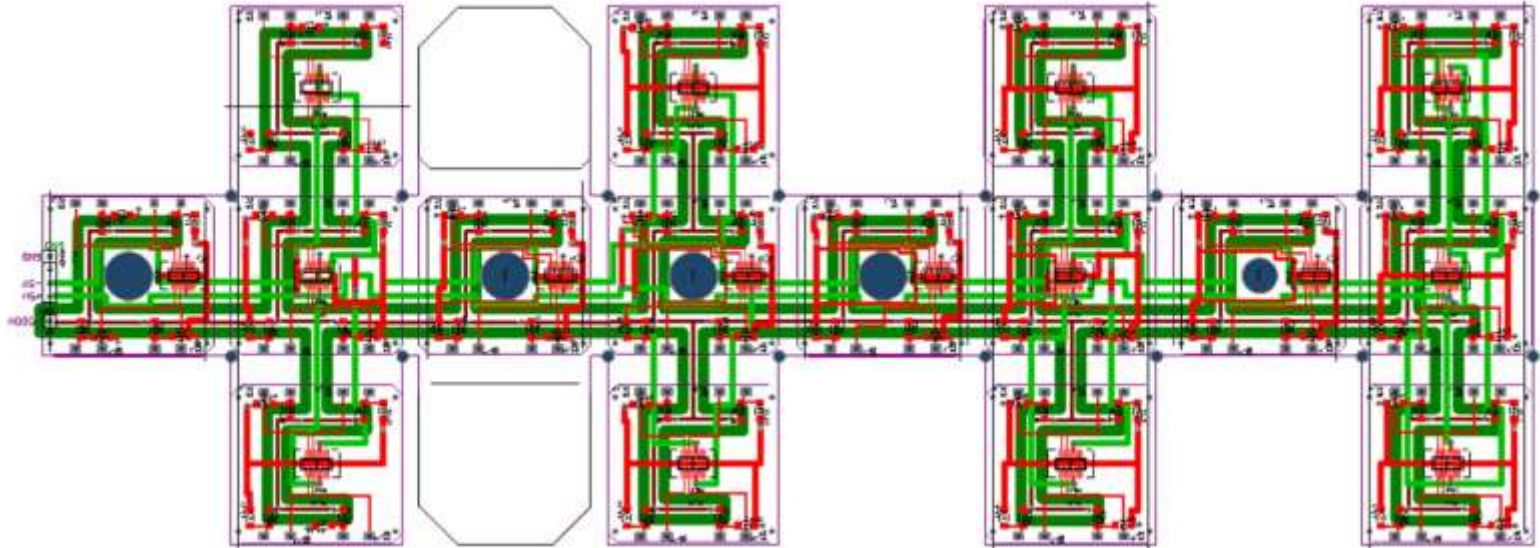


Detectors

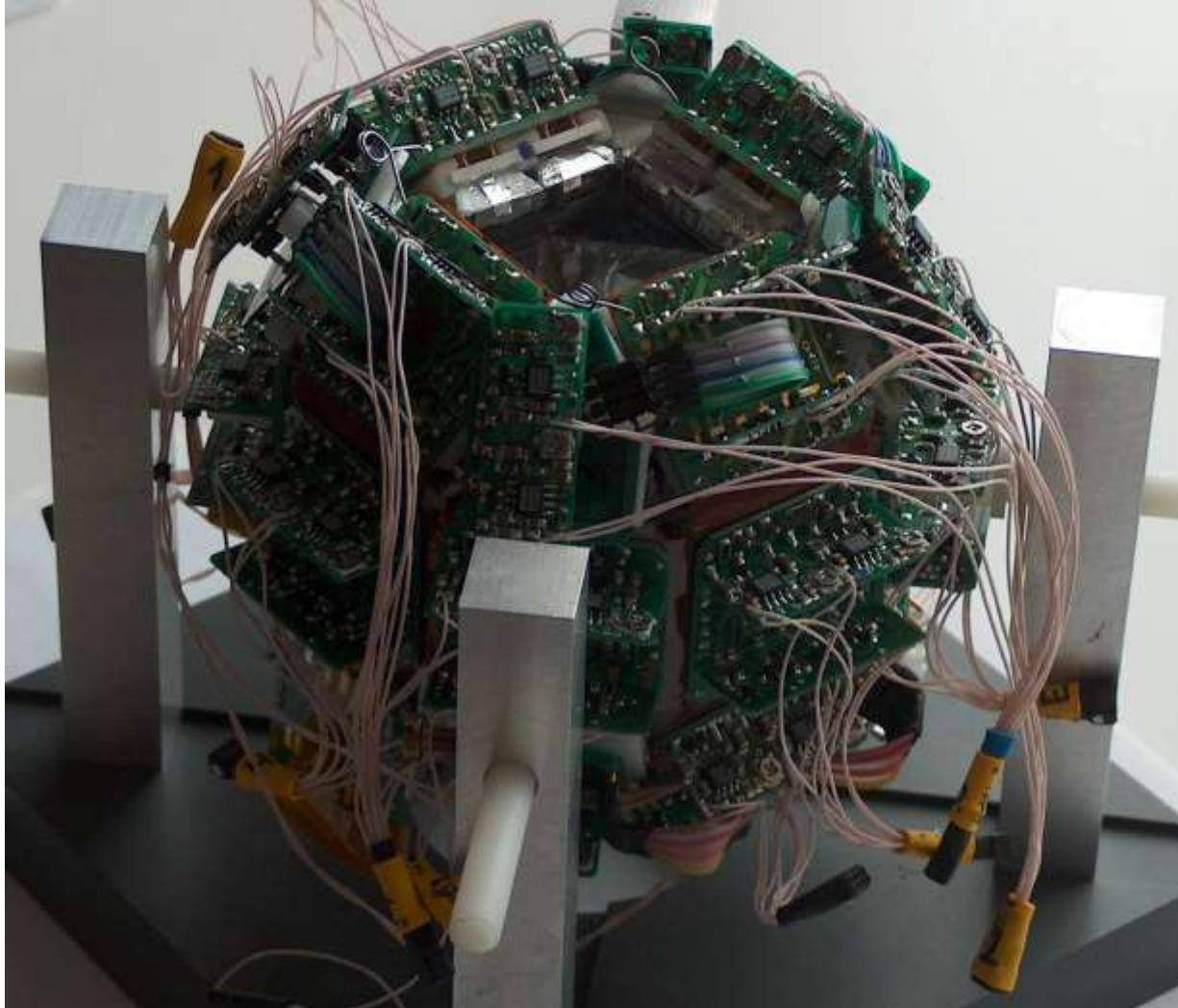
Configuration for plunger

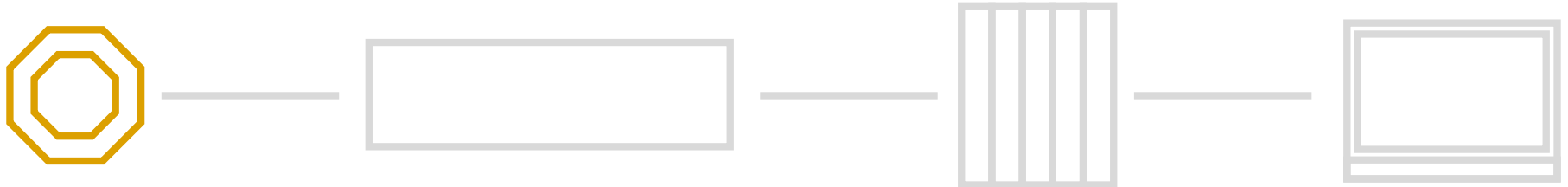


Configuration for plunger



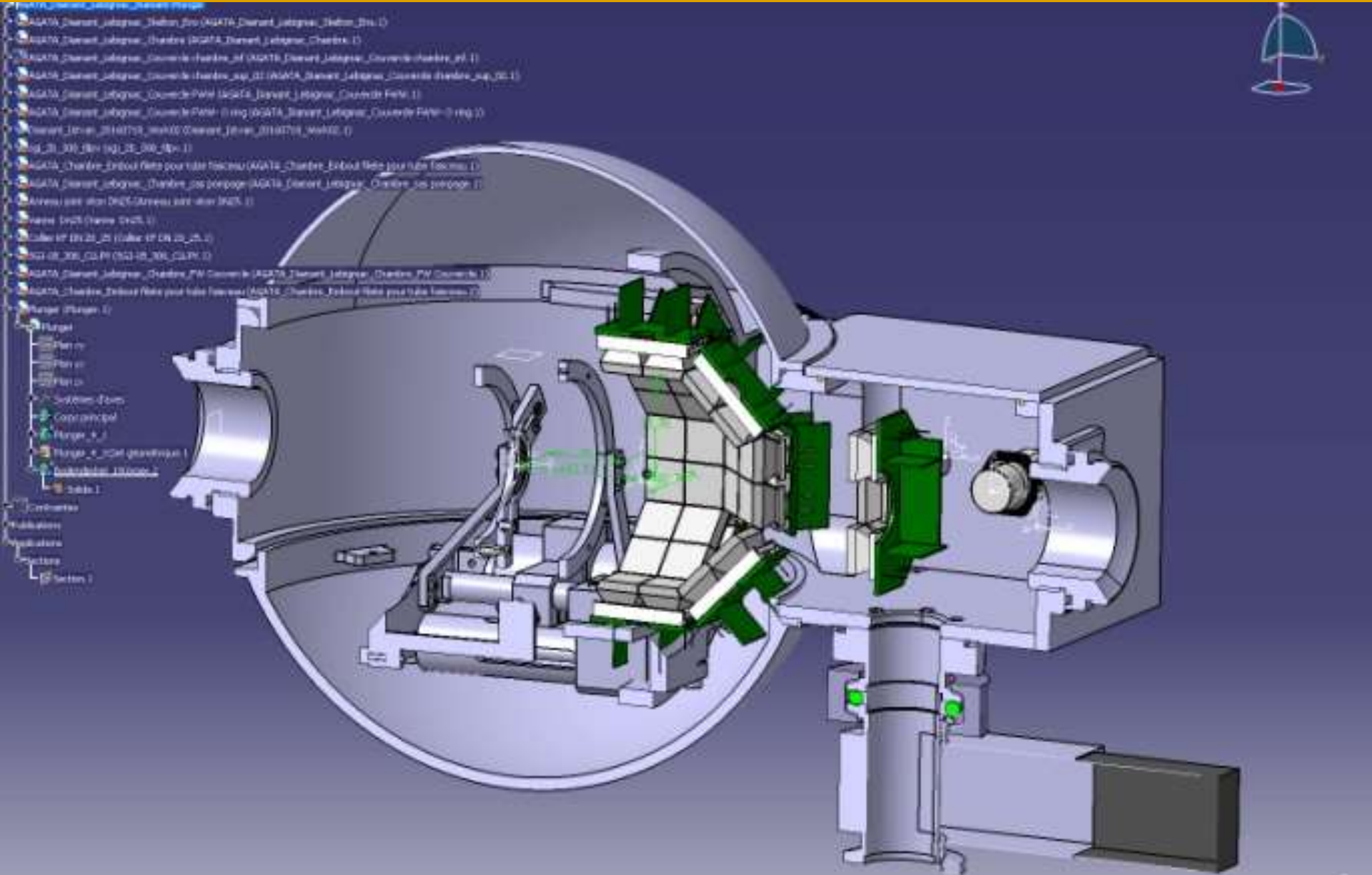
Configuration for plunger

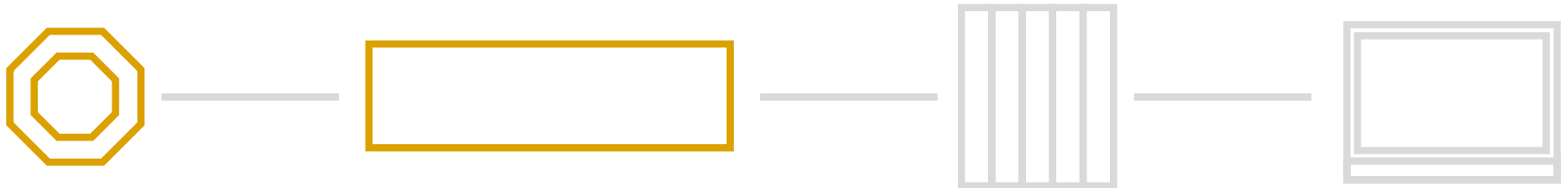




Reaction chamber

Reaction chamber for AGATA@GANIL

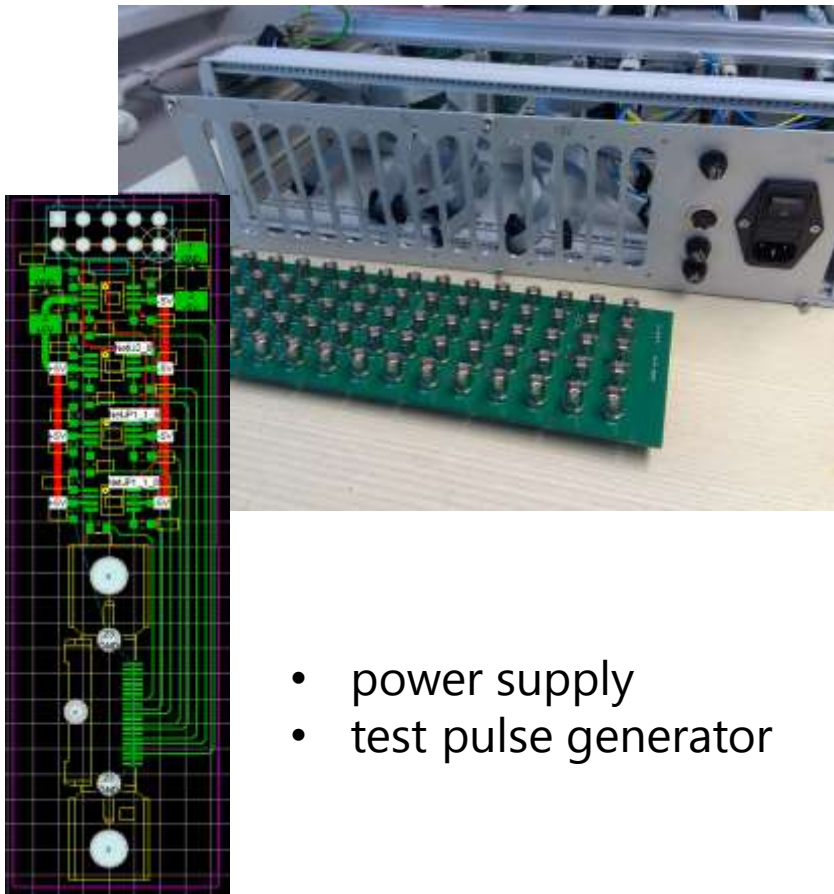




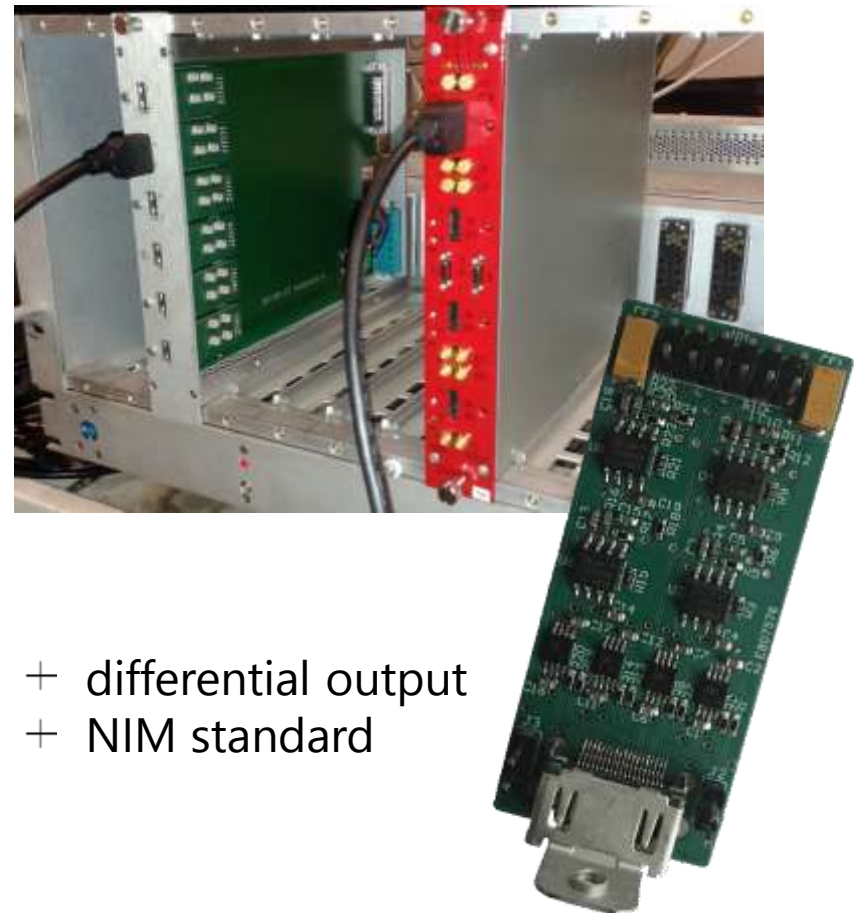
2nd stage preamplifiers

2nd stage preamplifiers

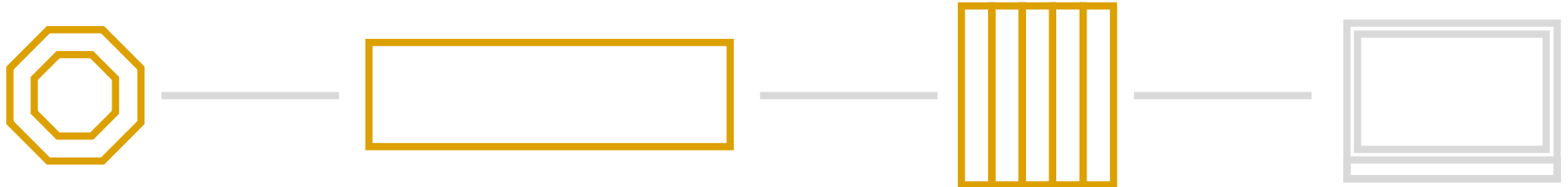
New 2nd stage preamps & power supply



- power supply
- test pulse generator



- + differential output
- + NIM standard



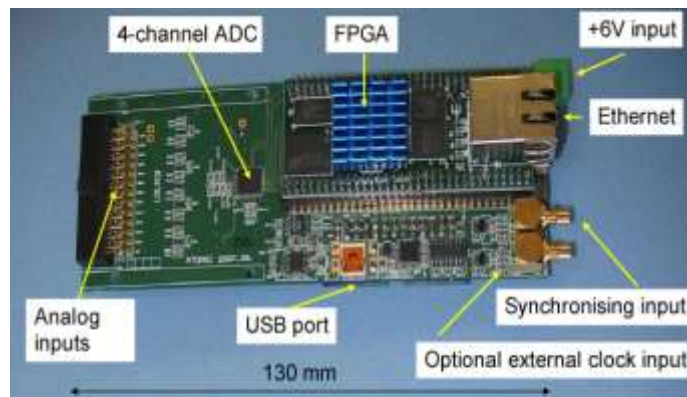
Digital electronics

NUMEX02 DSP

VXI analog electronics



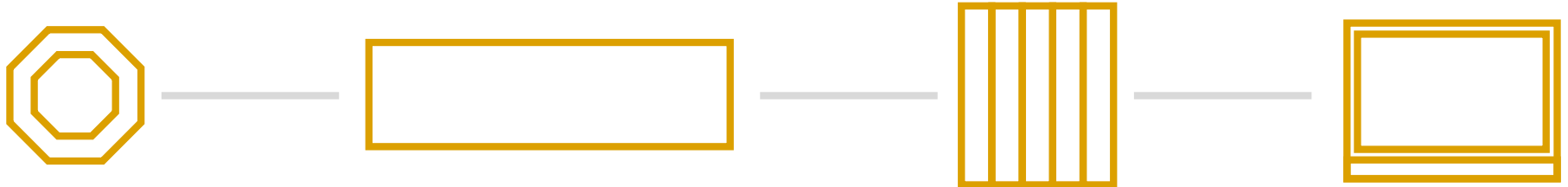
DSP module of ATOMKI based on Virtex-4 FPGA



NUMEX02 module for DIAMANT.



talk by M. Varga



Full setup, DAQ, in-beam tests

Current work

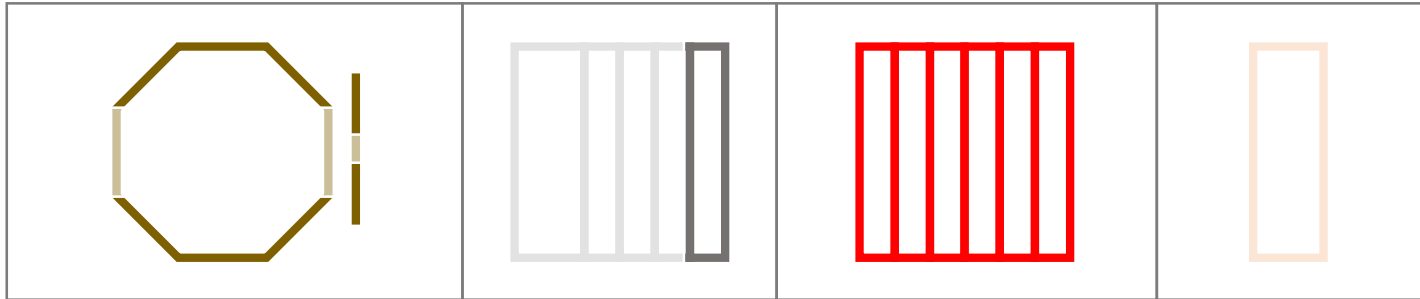
In-beam tests in ATOMKI



(?) January → trigger + 16ch DSP test (?)

DIAMANT configurations – summary

Theoretical maximum



Csl
96 channels

2nd stage
1 double NIM
4 single NIM

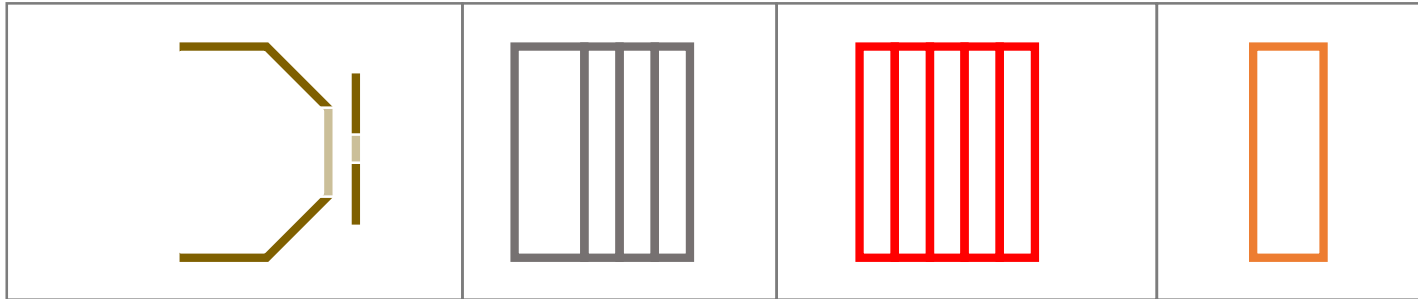
NUMEXO2
6 single NIM

GTS
1 double NIM

96 channels:
14 NIM slots
6x 1Gbps

Configuration for the next campaign

FW config (plunger)



Csl
72 channels

2nd stage
1 double NIM
3 single NIM

NUMEXO2
5 single NIM

GTS
1 double NIM

72 channels:
10 NIM slots
5x 1Gbps

The DIAMANT array

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