

# GARFIELD Back Cs array

- Mechanics
- Detectors
- Electronics
- Installation
- Cabling
- Commissioning

*A tale from 2017 to now*

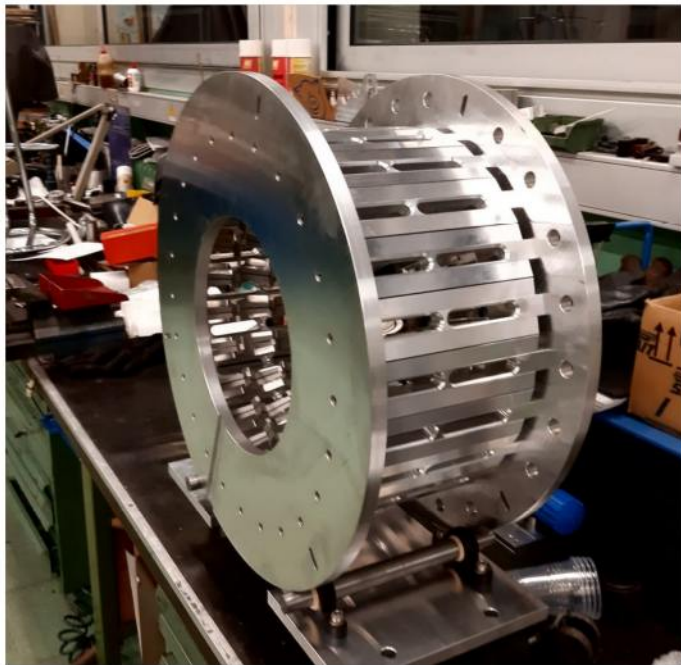
GC, S.Finelli, M.Guerzoni 2017-2019

GC, C.Cialdai, LNL workshop, Fi workshop 2019-2022

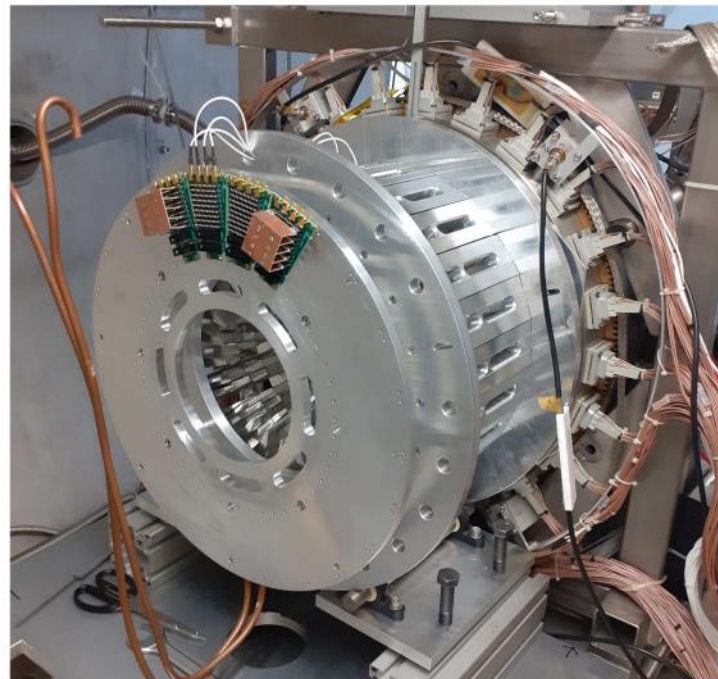
Support also by: Catalin, Caterina, Lucia, Giampaolo and ...

# GARFIELD Back Cs array

## ● Mechanics



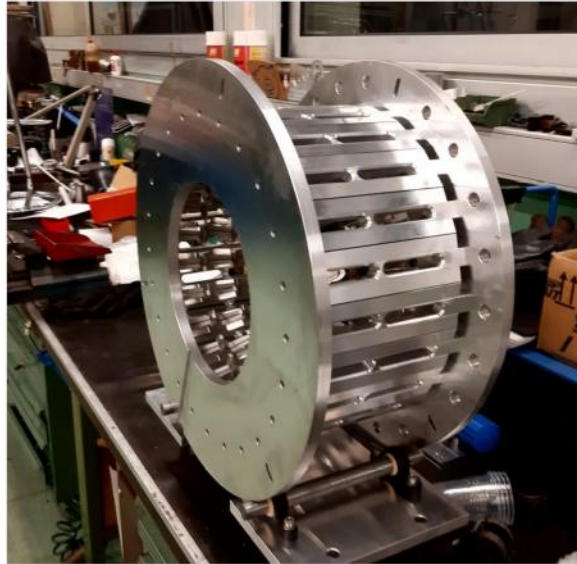
27 nov 2021



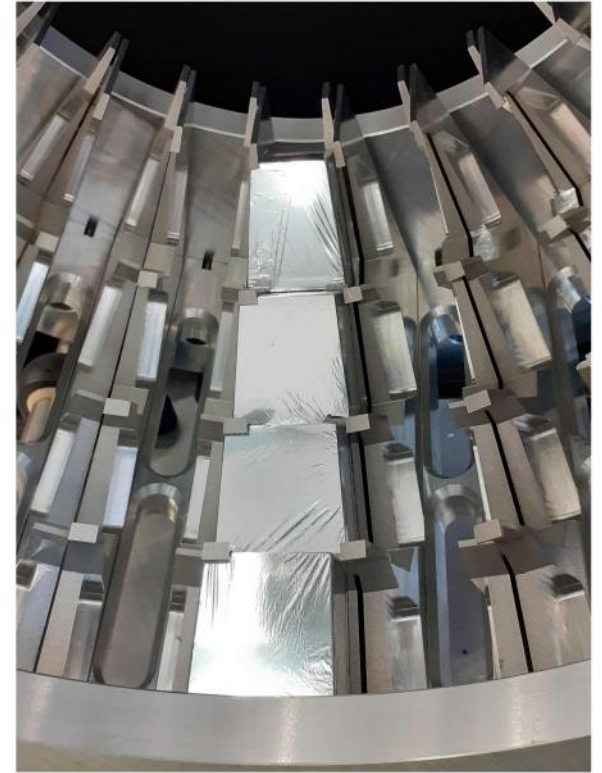
25 may 2022

# GARFIELD Back Cs array

## ● Mechanics



“semiguscio”



Leading idea: make life easier (for experimental physicist)

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## ● Mechanics: drawback



The special and complicate shape of crystals together with the compact mounting impose some blocking part in front of the crystals. The 2-4 corners of the crystal results to be masked by supporting shelves. This introduces shadowing in the LCP distribution which is not a good thing.

Mitigations have been so far:

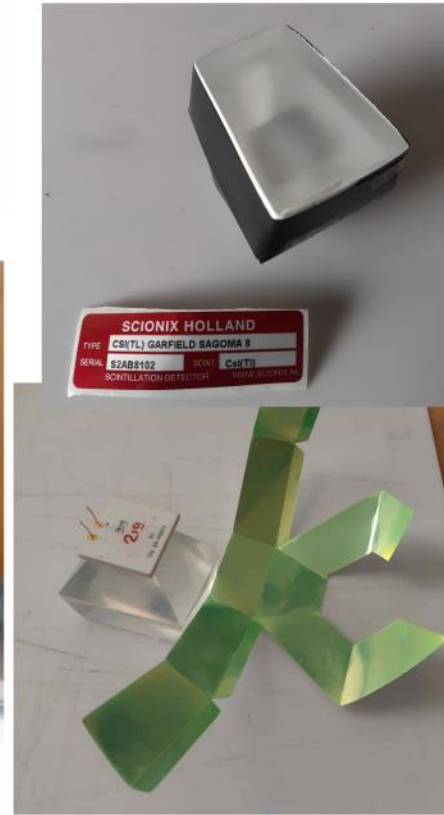
- 1) remove the shelves in one of the two parts
- 2) smooth and thin the supporting corners as much as possible. Artisanal operation.

**Further mitigation/corrections are under study with Carlo**

# GARFIELD Back Cs array

## ● Detectors

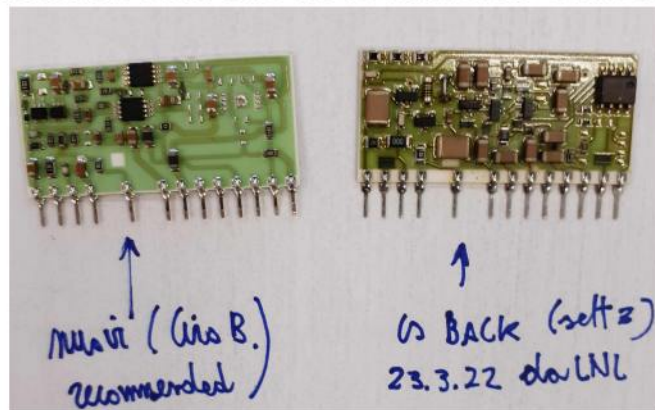
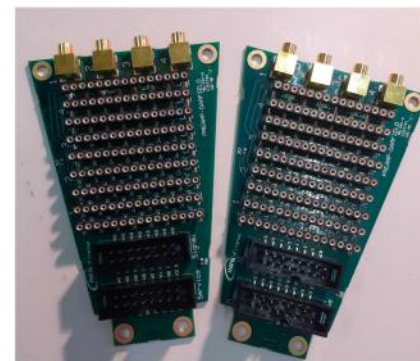
- Leading idea: reuse previous 84 Crystals back; dismantled and well packed in LNL (Tom, Magda,...)
- further 12 crystals + some spare ones (96 needed for the complete array)
- Revision of the complicated drawings, errors, series of different production, puzzle!
- Producer for new Cs: Scionix
- New design of Vikuiti wrapping foils; shaping and laser cut in Typography (with personal assistance many times)
- Procedure:  $^{60}\text{Co}$  check as they were, opening, re-gluing if necessary, new-wrapping,  $^{60}\text{Co}$  test for validation; applied for more than 100 cases
- $\Delta E/E(\text{fwhm})$  for most CsI passes from 10% to 7% (at  $^{60}\text{Co}$ ) in some cases the CsI were even worse.



# GARFIELD Back Cs array

## ● Electronics

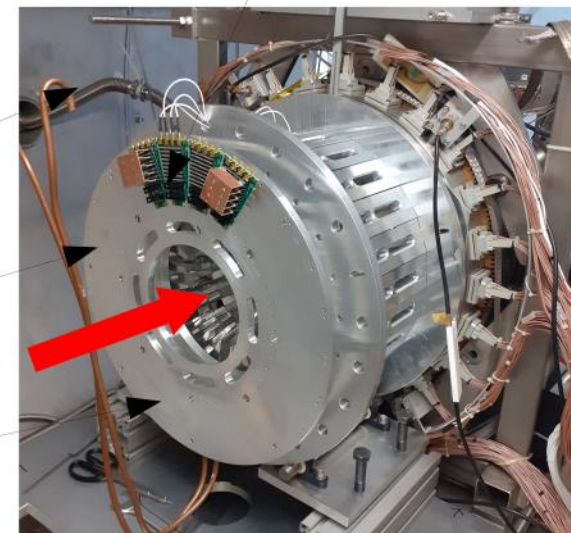
- Leading idea 1: reuse or use the already purchased PREAMP
- Leading idea 2: reuse the cables (8\*coax RG178 3M plug) in the chamber as they are (almost)
- Many checks to get rid of the chaos of the many versions of the Milano PREAMP
- New coax cables from PD to PCB studied and produced DELTRON.
- Situation now under control
- Re-design of the PCB for PREAMP biasing (GC, Carlo, production ARTEL): 4ch per boards
- Inserted two thermistors in spare pins (request by Tom, 2020)
- Cooling (moderate) via water flux.
- Evaluation and check documents sent to LNL and interested people.



Cooling tubes

Rotating structure  
to ease detector  
mounting

Cold supporting wheel



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## ● Installation

Important integration test at LNL (GC, Carlo, Giampaolo) 25 may 2022

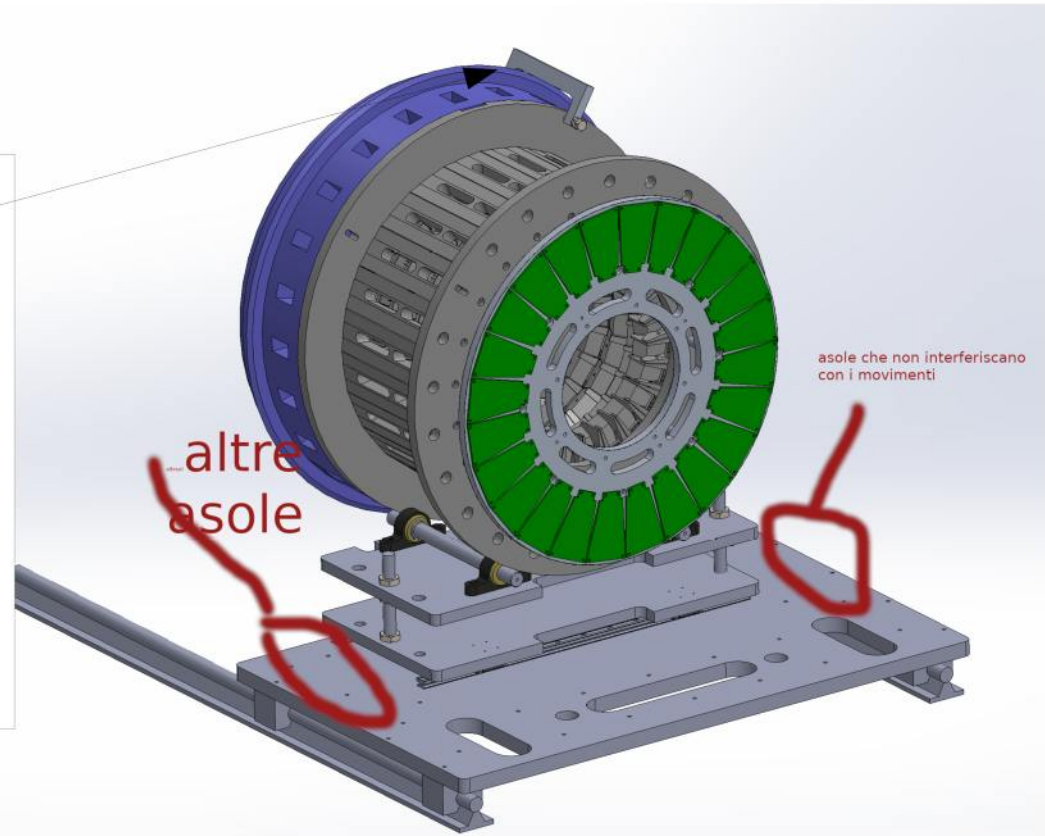
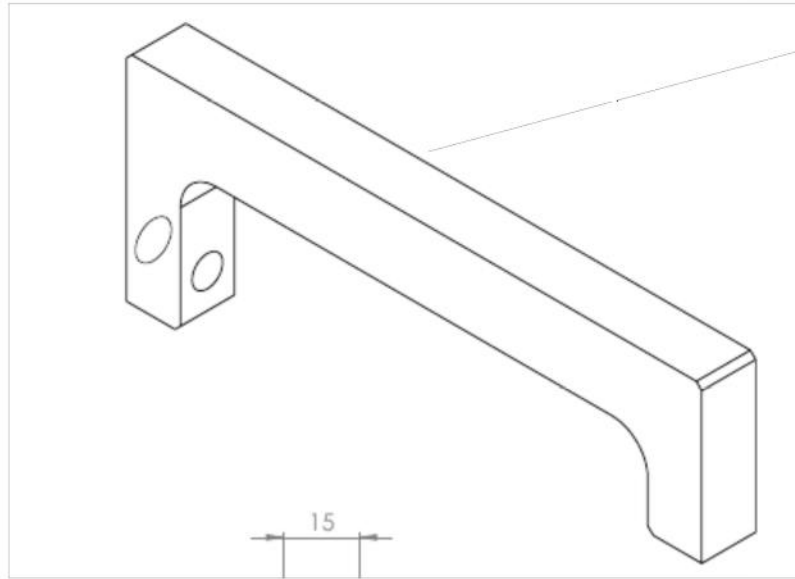
Performed checks and interventions decided

- Target insertion movement (modify the groove)
- Coupling with the FORW barrel (design and build the special clamps)
- Fine geometrical tuning and array displacements (finalized support plane design now in production)
- Cabling operation (ok, minor steps to do)
- Cooling circuit coupling (simple)
- others

Mechanical interventions: LNL and FI workshops (Carlo prepared the drawings)

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## ● Installation





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## ● Cabling

The idea has been to reuse at the best the cables 3M socket in the Chamber.  
Test, clean and reorder the cable groups now present (Tom, Giampaolo) to be done

- How to use and when the Temperature info (to me not crucial): we have 48 T resistors on 24 boards
- Reshuffle the external coax cables to go to correct paths (there are modifications, e.g. PD-HV are 2/board and pulser inputs are 2/board)
- Verify that the PD signal polarity (that can be operated with +- bias supply) has not effect of the performance due some asymmetric behavior of the preamp (at Florence I always use -HV for easy change to FAZIA crystals)

Fix a 3day session with Giampaolo!

# GARFIELD Back Cs array

- Commissioning
- The schedule of the commissioning can be made at various levels
- No precise idea, to date

## Operations

Complete mechanical adjustments (4 july)

Second installation test (5-8 july) with cooling test in atmosphere

External Cables prepared (mid july)

Target changes?

Within end september: detector mounting and test with the entire electronics

Tests with  $^{60}\text{Co}$  and CR

DAQ and Rco ???xy