EMC Forward

Mechanical Items

INFN Roma

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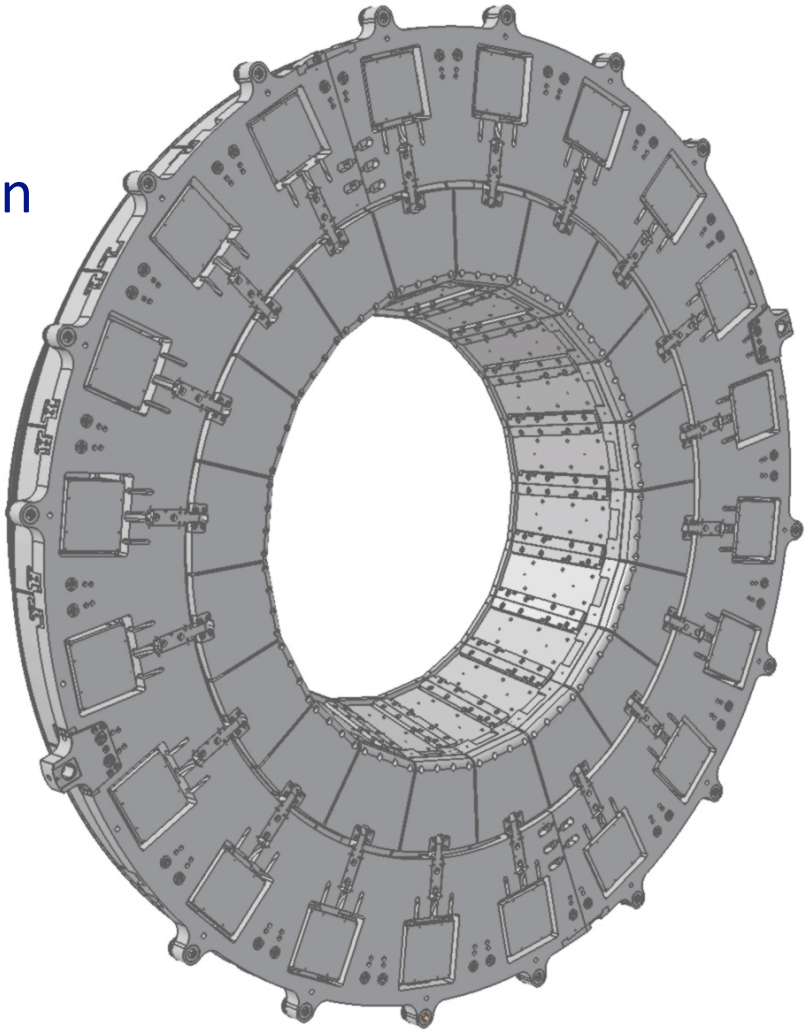
4th SuperB Collaboration Meeting - La Biodola (Isola d'Elba), Italy

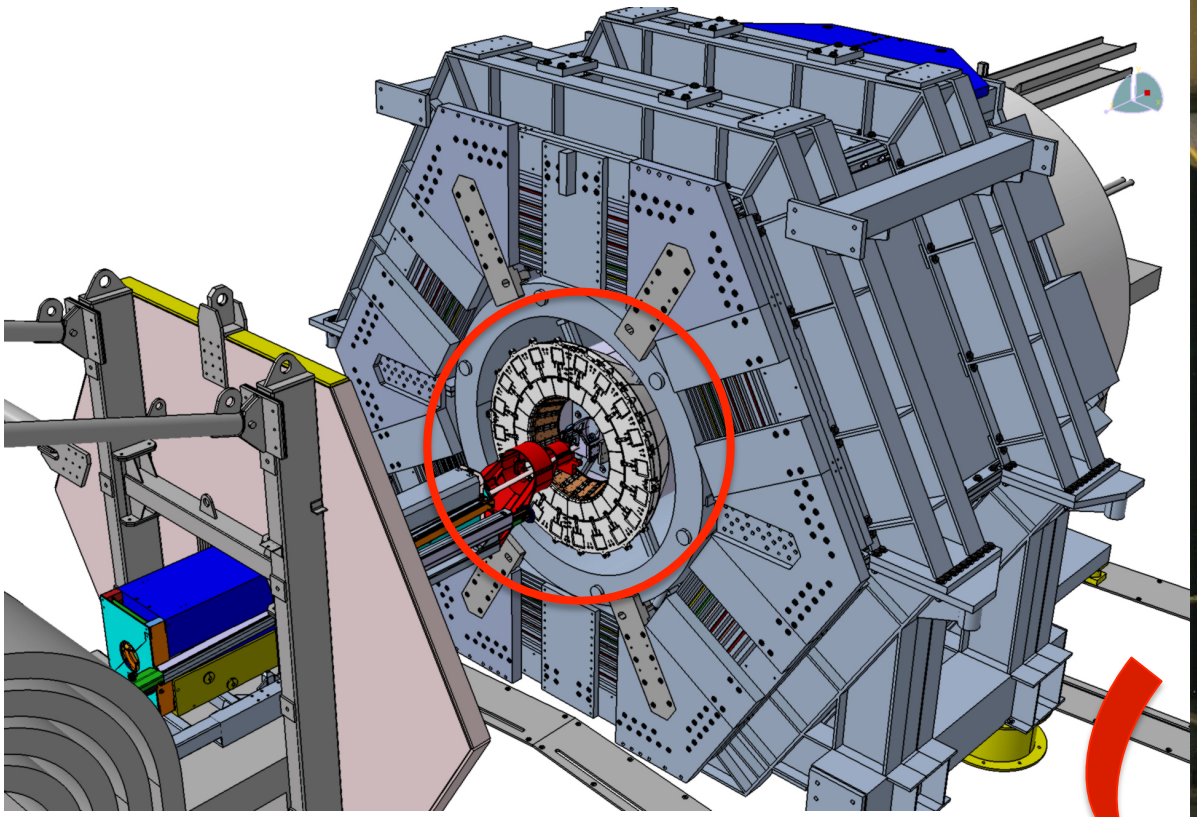
Overview

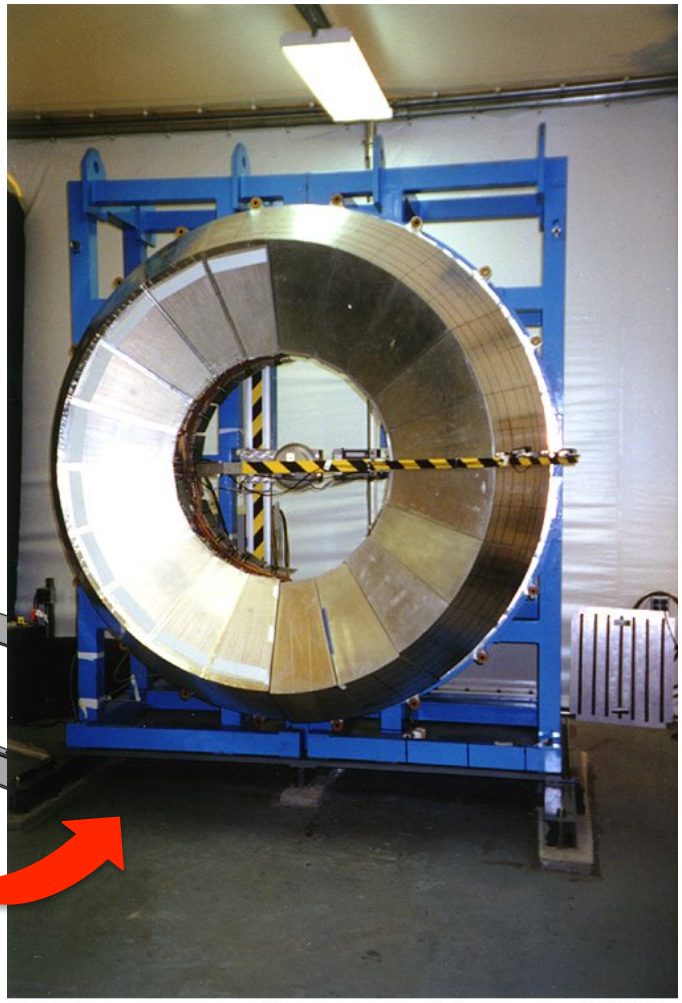
- **EMC Forward Current Status**
  - ✧ BaBar EMC: hybrid solution
  - ✧ the alternative LYSO solution
- **Mechanical Items**
  - ✧ FWD Spare Modules
  - ✧ Quality check in SLAC
  - ✧ Drawings and procedures
  - ✧ Shipment to Italy
- **Conclusions**



Current Status

TDR choice: complete reclaim of the BaBar Forward mechanical structure.





JF_014 Forward Endcap - complete 10/22/98

BaBar FWD designed and built in UK

Current Status

TDR choice: under this condition there are 2 hypotheses

A. The hybrid solution: to keep the original outer 2 rings, with **CsI(Tl)** crystals and to substitute the inner ring crystals, filling the cells with **Lyso**.

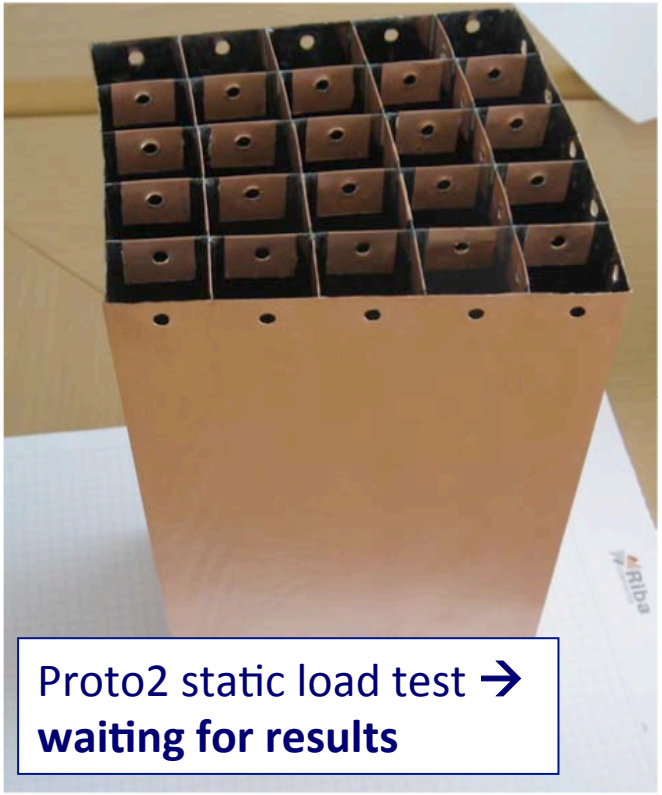
    - 4 Lyso crystals to fit the original inner cells

B. Substitution of all original crystals with **pure CsI** crystals

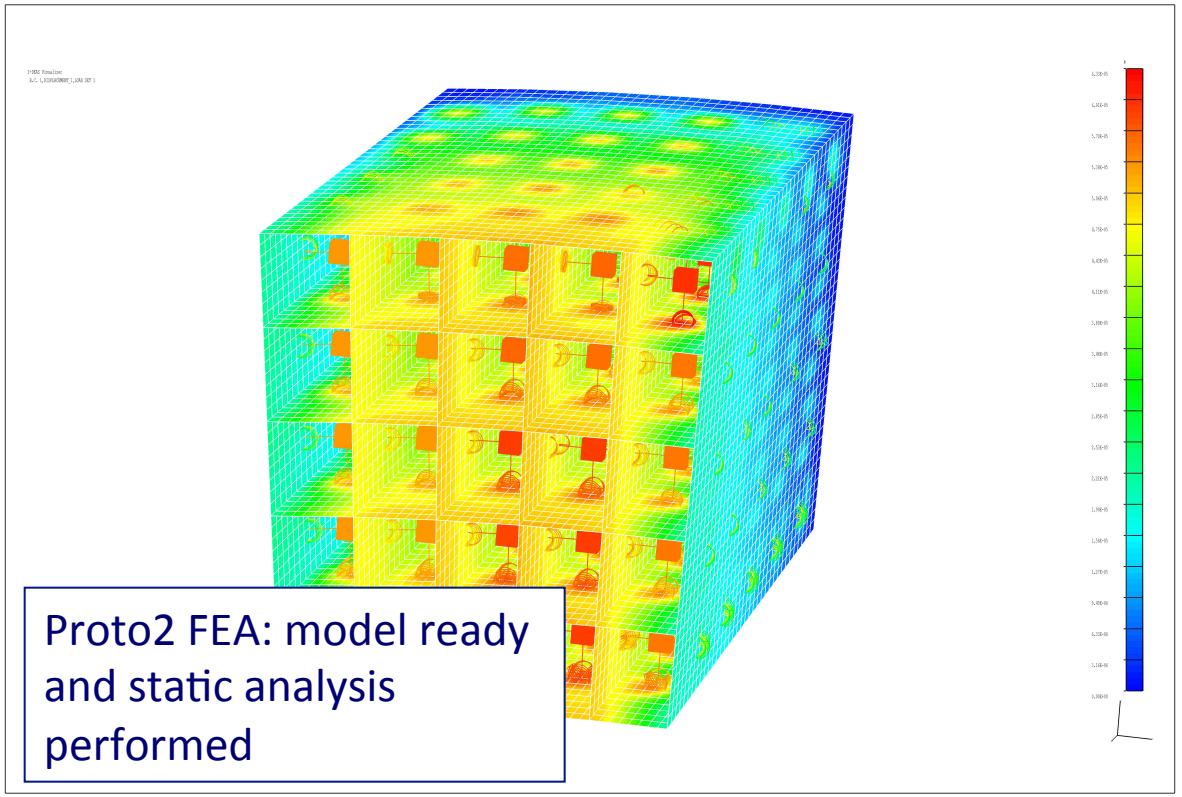
The A) hypothesis is more complex for the Lyso crystals presence and for the reutilization of the original outer crystals; however in both case the BaBar FWD mechanical structure will be recovered.

Current Status

Alternative choice: a new made mechanical structure for EMC Forward, populated by only LYSO crystals (*M. Lebeau prototype and INFN Rome1 FEM Analysis*)



Proto2 static load test → **waiting for results**



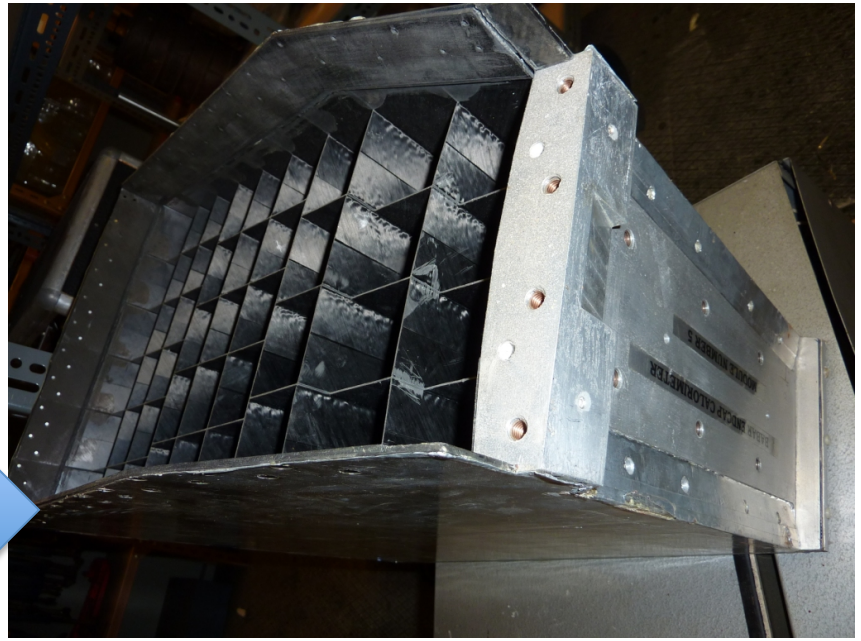
Proto2 FEA: model ready and static analysis performed

For the moment this solution has been sent backward (too expensive) → *see A. Zullo's talk*

EMC FWD Mechanical Items

1st item: necessity to have in Italy the FWD spare module now at SLAC. Feasibility studies and tests necessary (materials characterization), in order to define the **optimal procedure for crystals substitution**.

- **Caltech** and **SLAC** people are already working to provide the 2 modules present at SLAC; the optimal solution about reliability.

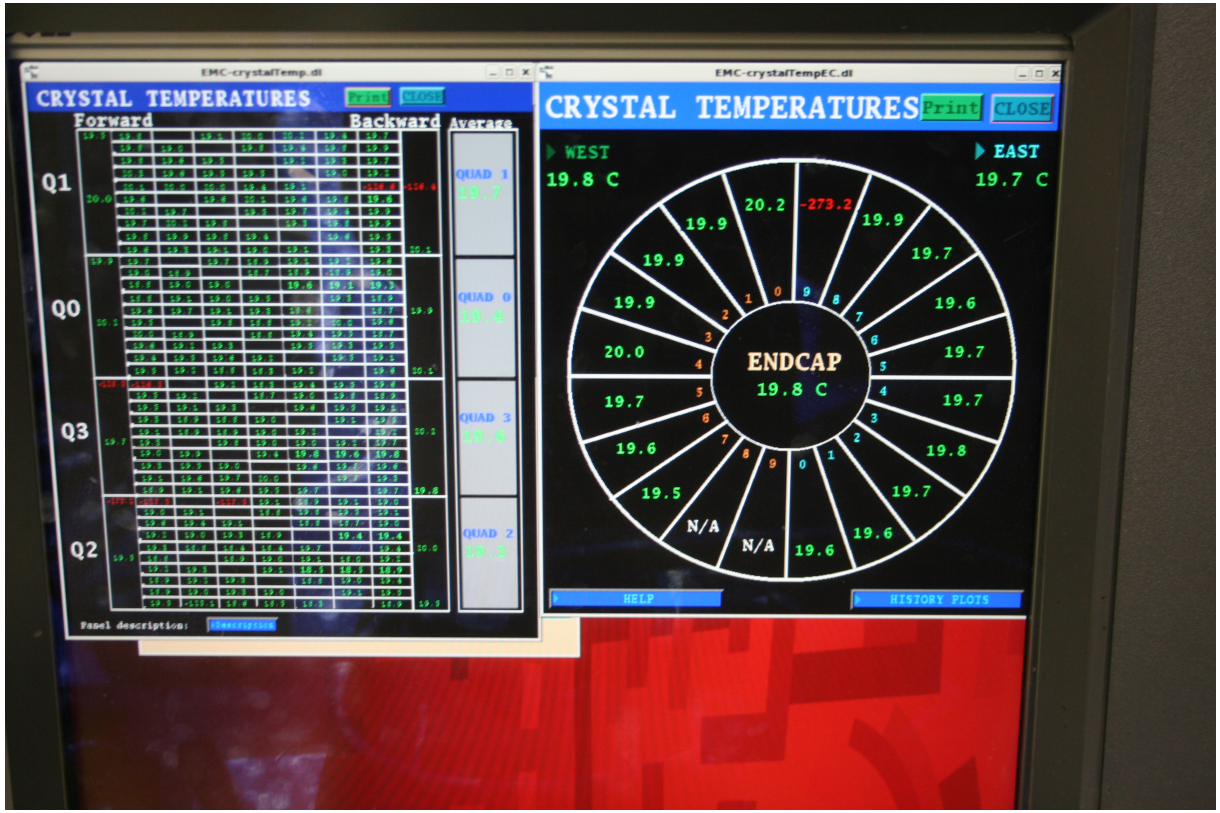


- 1 module located in UK; probably a prototype and significantly different respect to definitive ones

EMC FWD Mechanical Items

2nd item: **necessary** to perform, at SLAC, a quality check of:

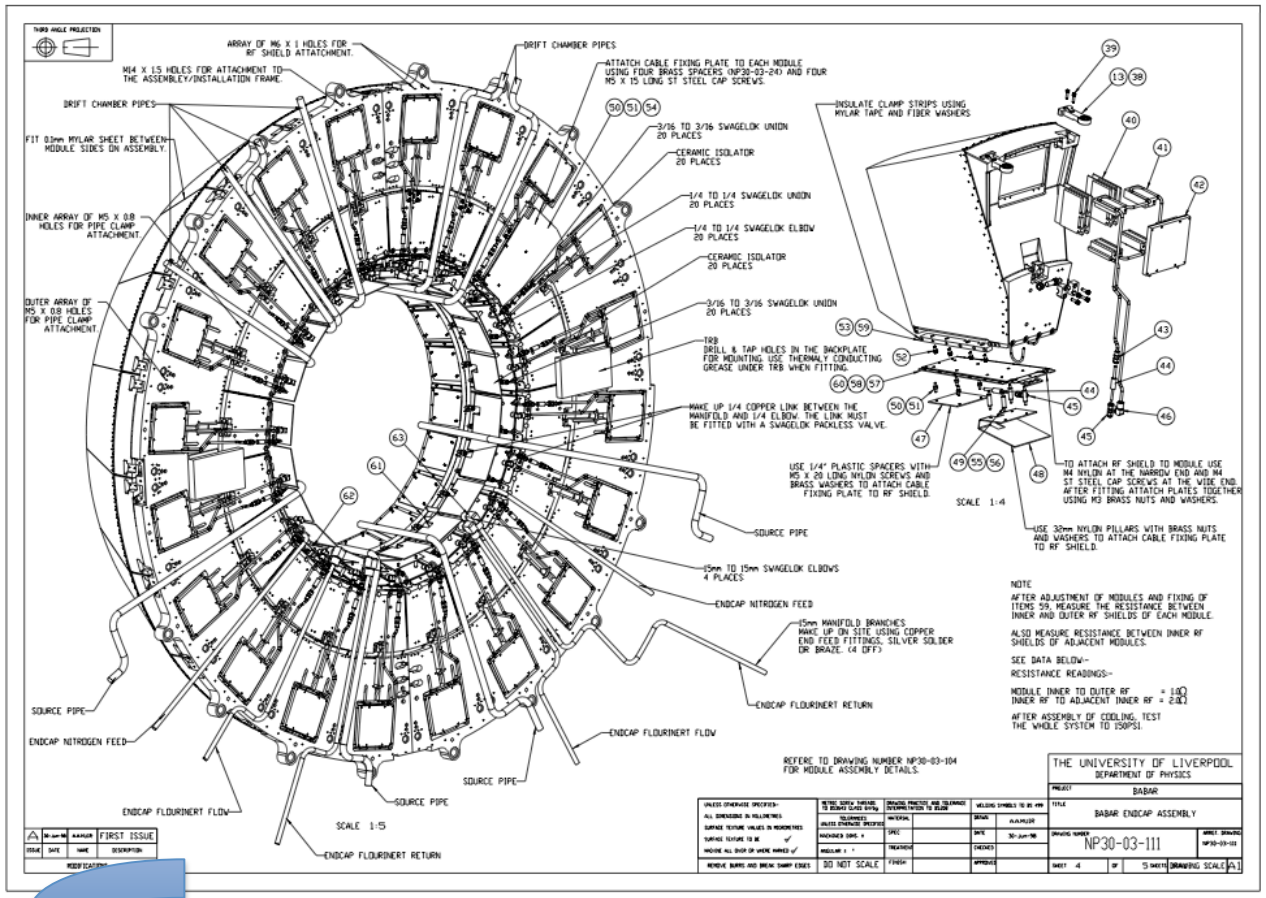
- FWD mechanical structure inspection
- CsI(Tl) original crystals sample

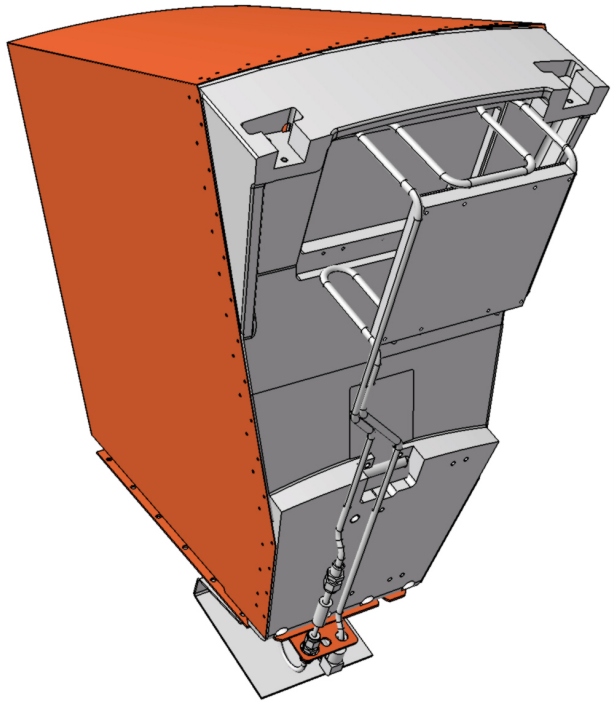


Presently the FWD is stored in SLAC and kept in thermalized condition (about 20°C).

EMC FWD Mechanical Items

3rd item: presently available drawings and CAD files about the FWD mechanical structure.



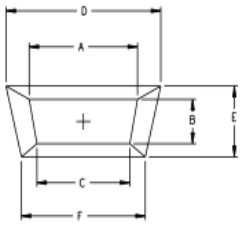


They're all available in the repository: http://cadrm.roma1.infn.it/SuperB

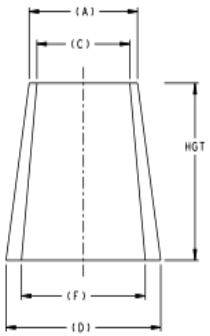
EMC FWD Mechanical Items

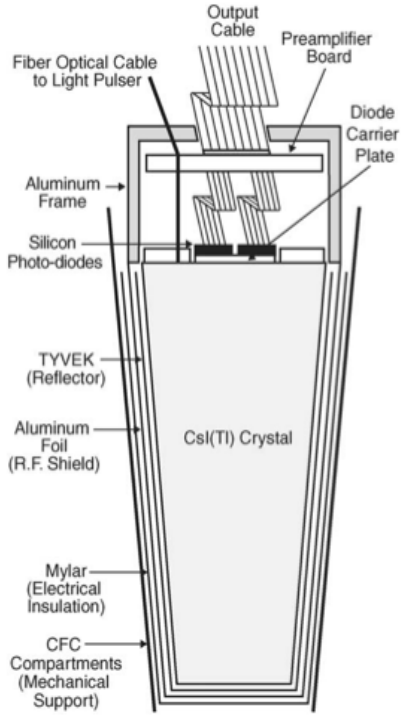
4th item: some information still need to be collected:

- ❑ Alveolar structure; clashing documents and drawings about the CFC wall thickness
- ❑ Assembly procedure for the 20-modules on the back plate → **components list**
- ❑ Crystals connections inside the alveolar structure, both for electronics and for support
- ❑ Crystals wrapping and dimensions (*BaBar TDR, March 1995*) → **crosscheck with measurements on spare modules**



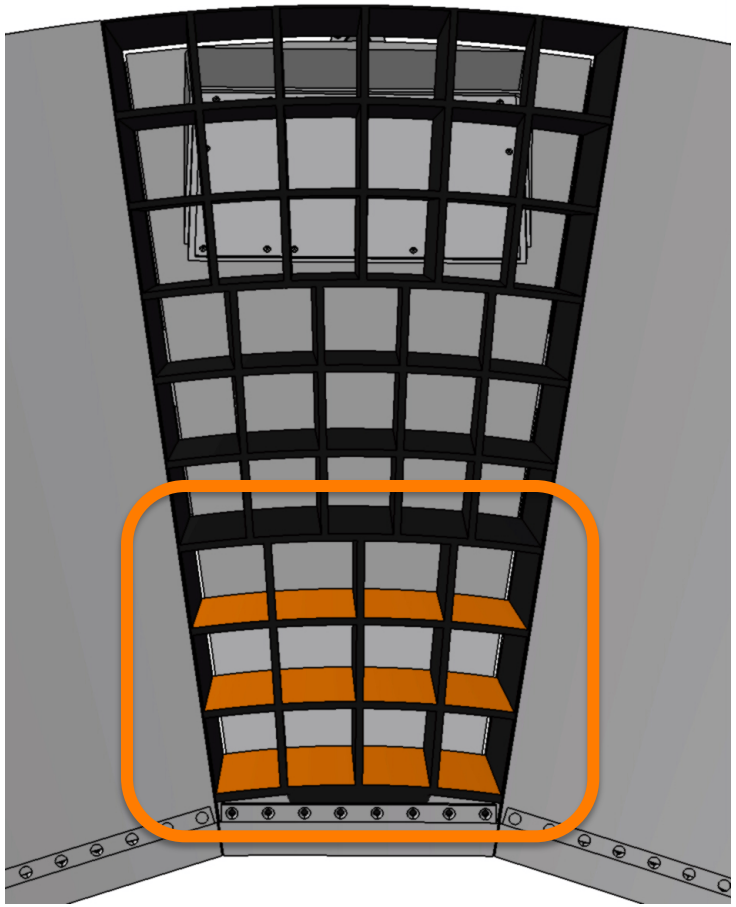
θ Row	Number Needed	Volume (cc)	A (cm)	B (cm)	C (cm)	D (cm)	E (cm)	F (cm)	Height (cm)
1	80	741.0	4.298	4.670	3.944	4.995	5.426	4.583	32.55
2	80	802.4	4.641	4.670	4.289	5.394	5.428	4.985	32.55
3	80	863.6	4.982	4.670	4.632	5.792	5.430	5.386	32.55
4	100	739.6	4.247	4.670	3.970	4.941	5.432	4.618	32.55
5	100	788.3	4.519	4.670	4.244	5.257	5.433	4.937	32.55
6	100	836.9	4.790	4.670	4.517	5.573	5.433	5.256	32.55
7	120	737.7	4.209	4.670	3.984	4.898	5.434	4.636	32.55
8	120	778.4	4.437	4.670	4.214	5.162	5.433	4.903	32.55
9	120	819.1	4.665	4.670	4.445	5.427	5.432	5.171	32.55



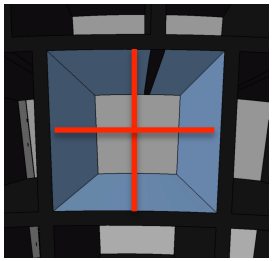


EMC FWD Mechanical Items

- Once observed and measured spare modules, it will be possible to proceed defining the optimal way to insert LYSO crystals inside the inner FWD ring.



- Lyso crystals are smaller than CsI(Tl) original ones; there are presently 2 hypotheses under investigation:
  - To wrap them together, in order to fit in the CFC cells
  - Use a subset of "partition panels" able to subdivide each original cell

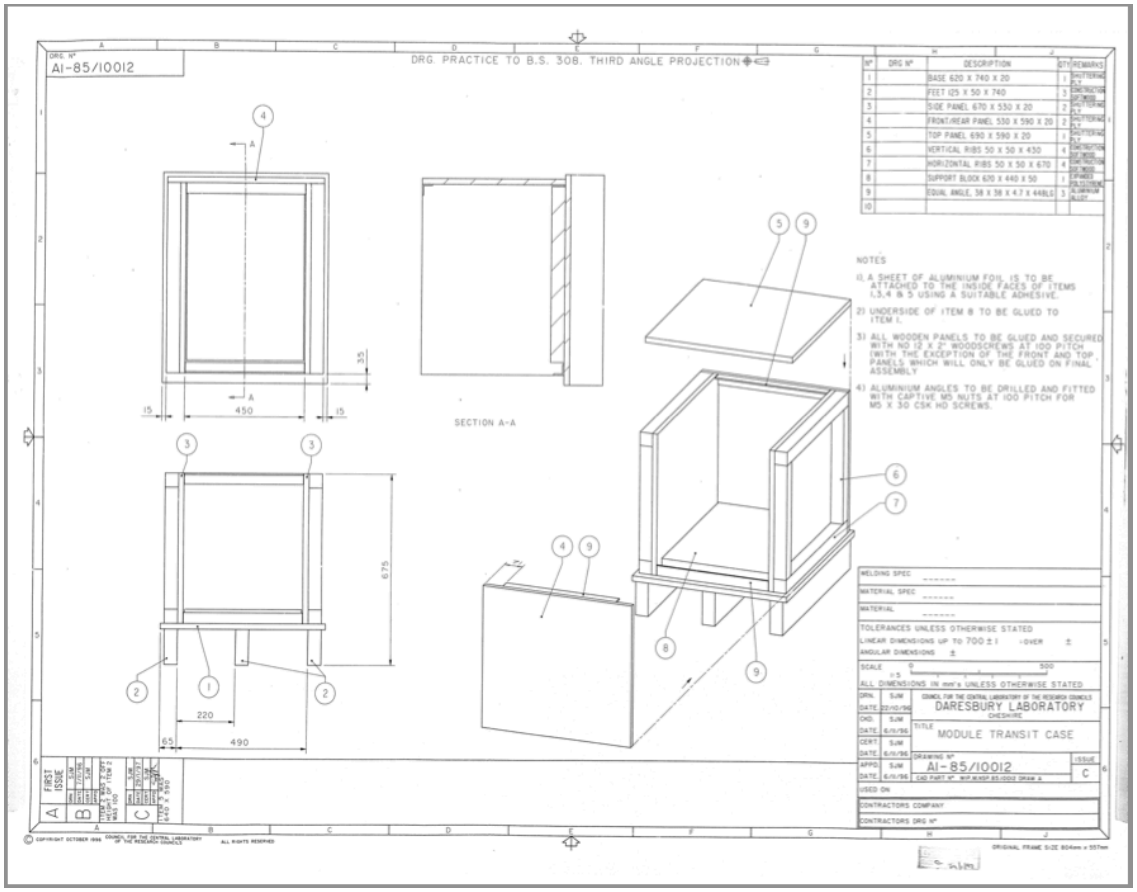


- Pay attention to electronics on the back

EMC FWD Mechanical Items

5th item: FWD shipment to Italy (after a successful quality check). Actually 2 hypotheses are being examined:

① Repeat the past experience, dismounting the structure and shipping separately the single modules in some transit crates.



- *Past shipment from UK to SLAC:* insulator inside the crate (polystyrene), sealed container by air freight/truck, no conditioning system.
- *Next shipment:* possible something more advanced for the environmental humidity and temperature control (van-conditioned truck)
- Standard clean room sufficient to manage and host single modules

EMC FWD Mechanical Items

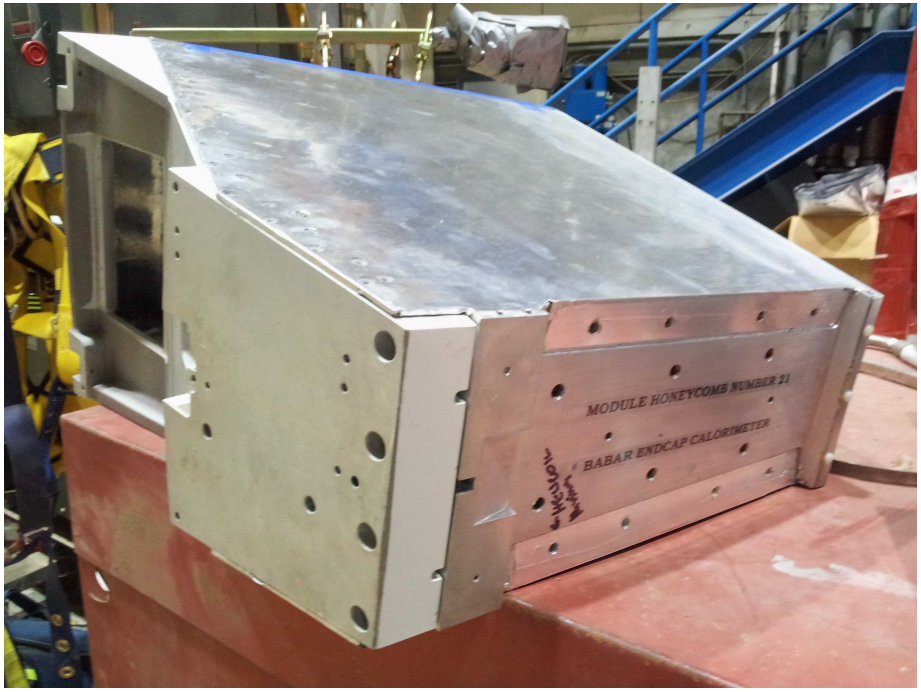
5th item: FWD shipment to Italy (after a successful quality check). Actually 2 hypotheses are being examined:

② Ship the 2 monolithic halves, together with their support structures. This hypothesis implies to not dismount the 20 modules.

- Shipment probably more expensive and complex (conditioned container)
- Necessity to validate the existing support structures for the shipment (designed only for installation)
- Larger and crane-equipped space to host FWD, once arrived in Italy

Conclusions

- From a technical point of view, the main necessity is to have in Italy (INFN Rome1), the FWD **spare modules** available at SLAC. Once observed its mechanical features, in particular the honeycomb zone, it will be possible to proceed and define the optimal procedure for LYSO crystal insertion



- The FWD shipment final choice, in collaboration with SLAC group, will depend by survey results on these modules, by survey on real FWD, and by space available in Italy to host it.

Conclusions

- Spare modules could be used to test and validate the chosen shipment procedure to Italy.
- Spare modules could be used to test assembly/dismounting procedure, in collaboration with Caltech/SLAC group.
- Only once fixed the previous points will be possible to think to all the other subsystems (cooling, calibration, barrel-integration)

I would like to thank:

- ***Caltech and SLAC people***
- ***STFC Daresbury Lab people***

for the collaboration and for the availability shown, collecting these information