



# AMS-02 tracker mechanics

*status of  
construction, assembly, integration*



Eric PERRIN, UniGe

## Production:

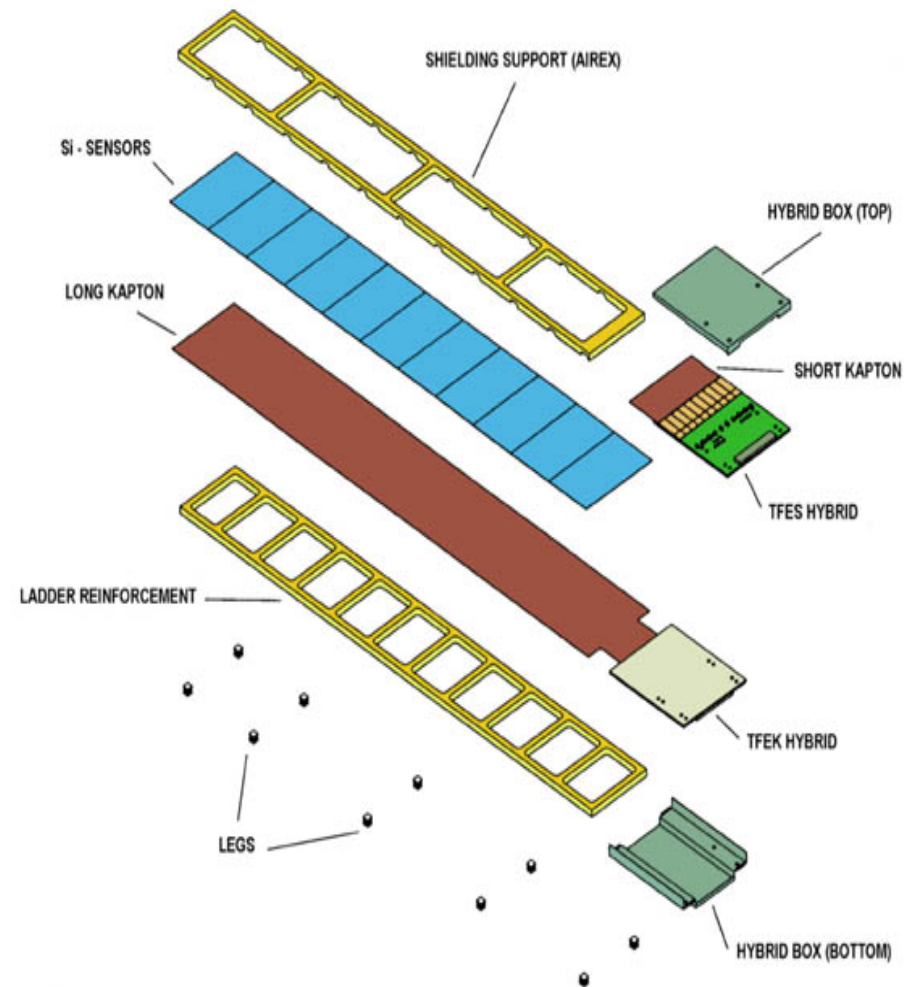
- *Ladder integration*
- *Installation on planes*

## Inner tracker assembly:

- *Assembly*
- *Cabling*
- *Evaporator status*
- *Future work*

# Ladder Assembly Status (Perugia-Geneva)

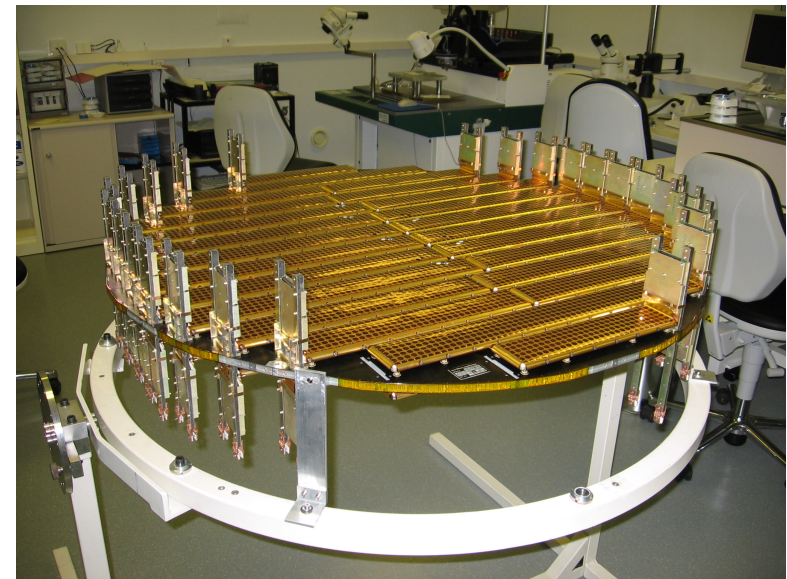
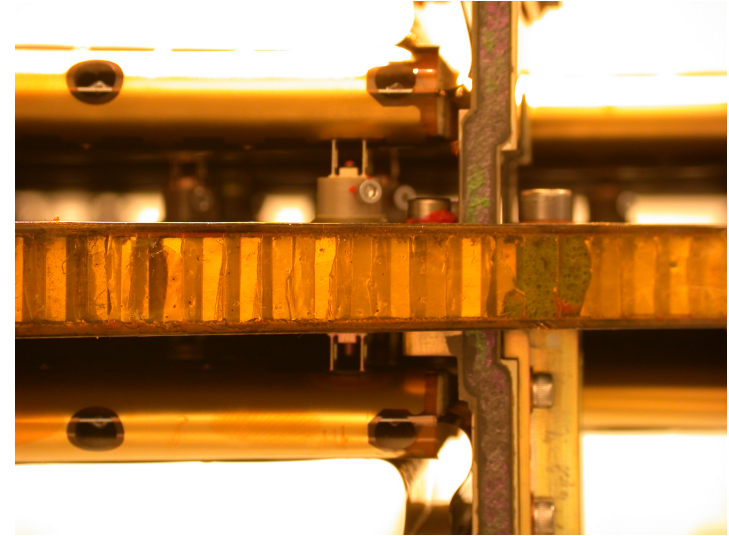
- **ASSEMBLY**
- ~ 210 ladders build
- **PHASE 2** hybrid box & legs gluing
- ~ completed
- **EMI SHIELDING**  
( kapton foil wrapping)
- ~ 31 ready for process
- Full test at each step with RA source and noise control



# Status of installation of ladders on planes

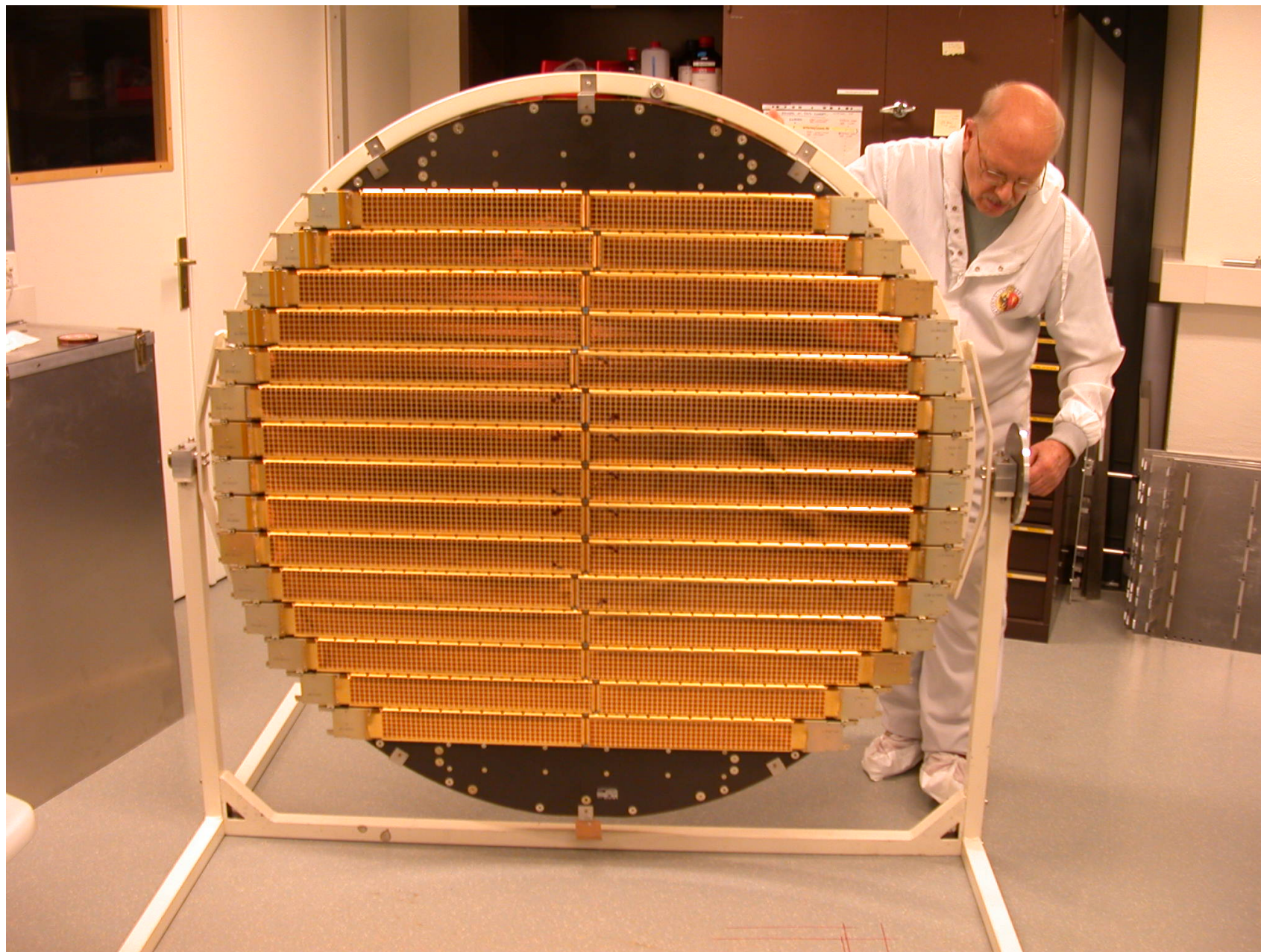
*Philippe Bouvier*

- Plane 1:
  - layer 1, 30 ladders: *just started*
- Plane 2:
  - layer 2, 24 ladders: *completed*
  - layer 3, 22 ladders: *completed*
- Plane 3:
  - layer 4, 20 ladders: *completed*
  - layer 5, 20 ladders: *completed*
- Plane 4:
  - layer 6, 22 ladders: *completed*
  - layer 7, 24 ladders: *completed*
- Plane 5:
  - layer 8, 30 ladders: *completed*





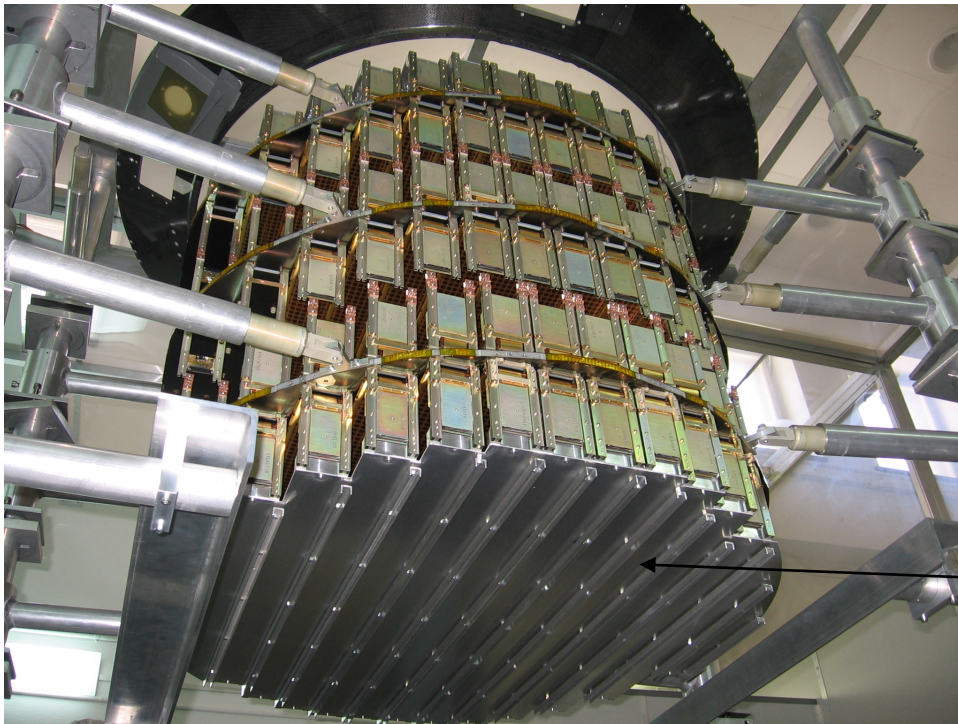
Plane 5 complete, tested, just before packing





## Assembly of the Inner Tracker at UniGe

- Inner tracker presently in assembly phase, inside the Tracker Assembly Frame.

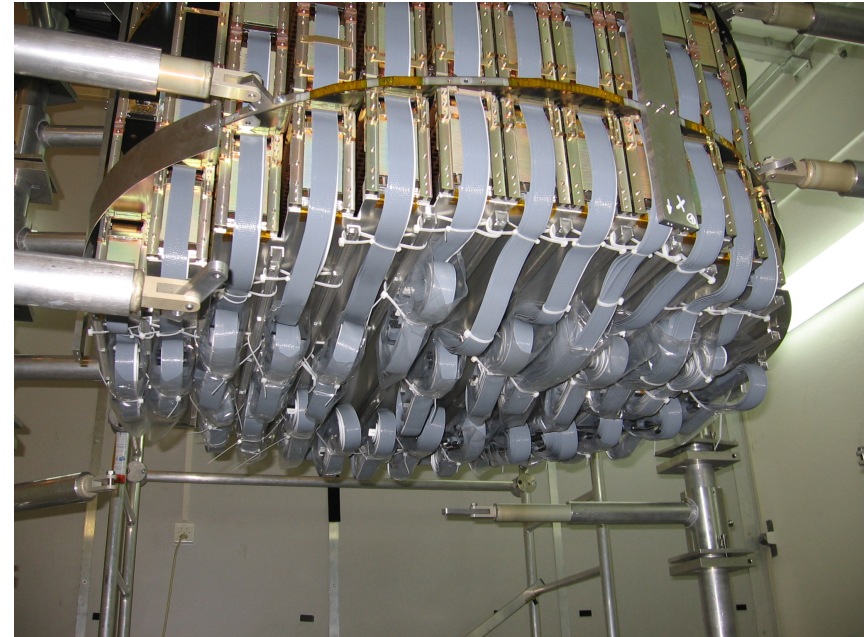
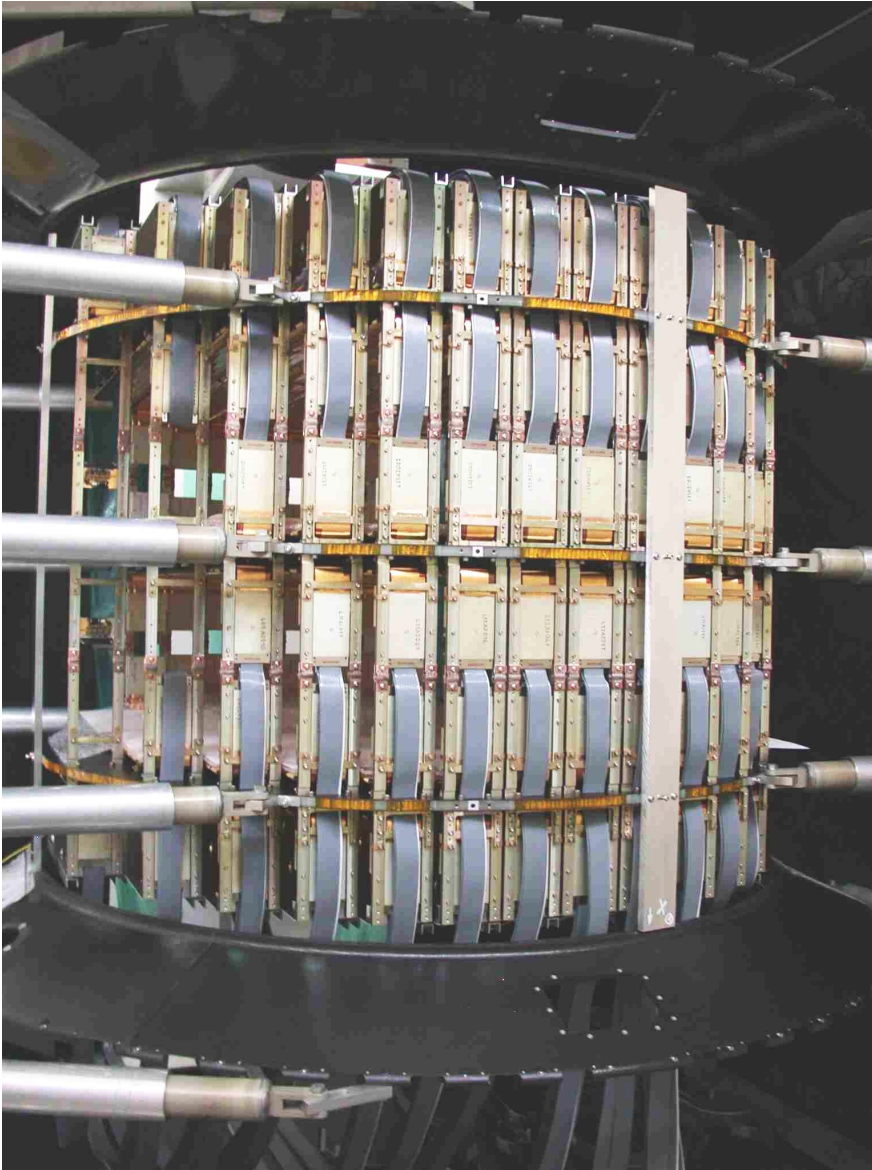


Temp. Structure to support cables,  
One on top, one on the bottom

## Inner Tracker is now cabled and tested

*Manfred Willenbrock*

*Samuel Delaere*



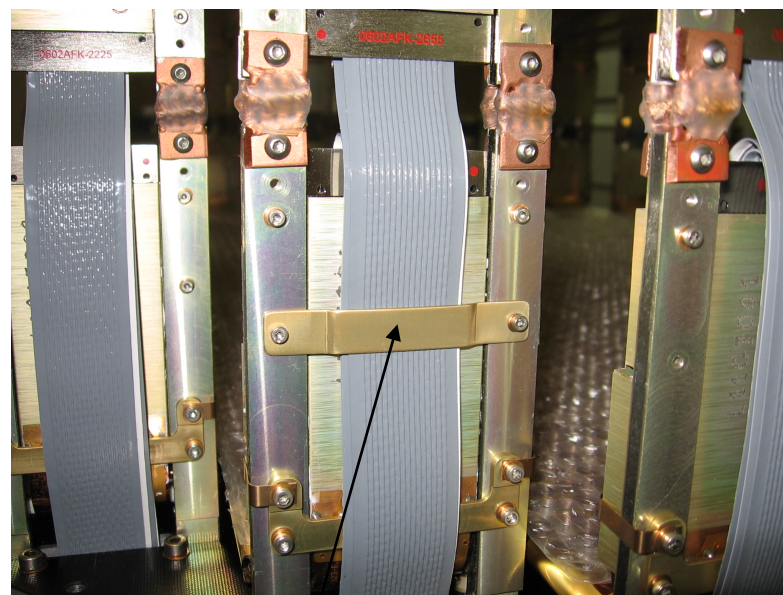
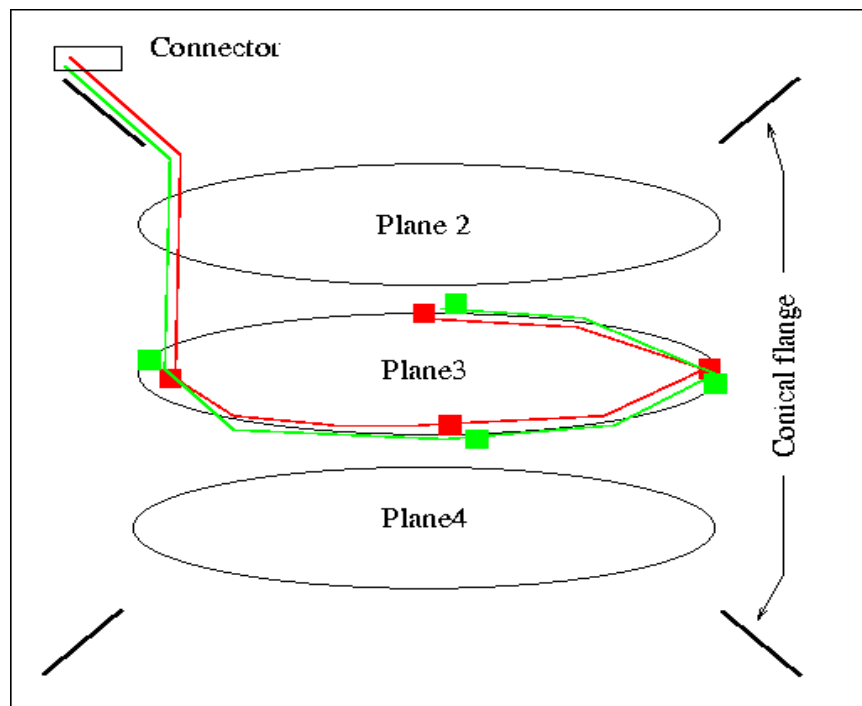
Extra lengths of cables is stored on  
top and bottom temp. supports

Each cable has been electrically-tested, its length checked  
before installation (*Filipe Da Silva*)



## To be done before closing the shell sectors:

- Mount the thermal sensor chain.
  - Layout and location has been agreed
  - Chain fabricated but some technical problems to be solved



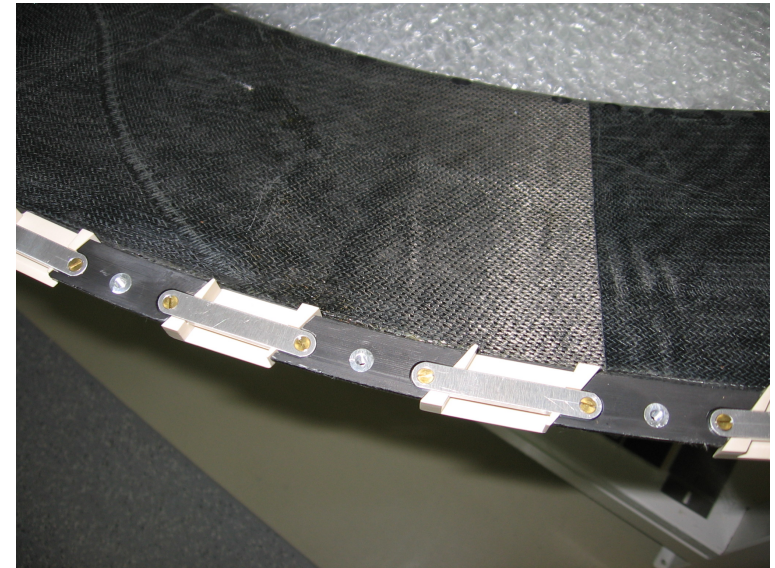
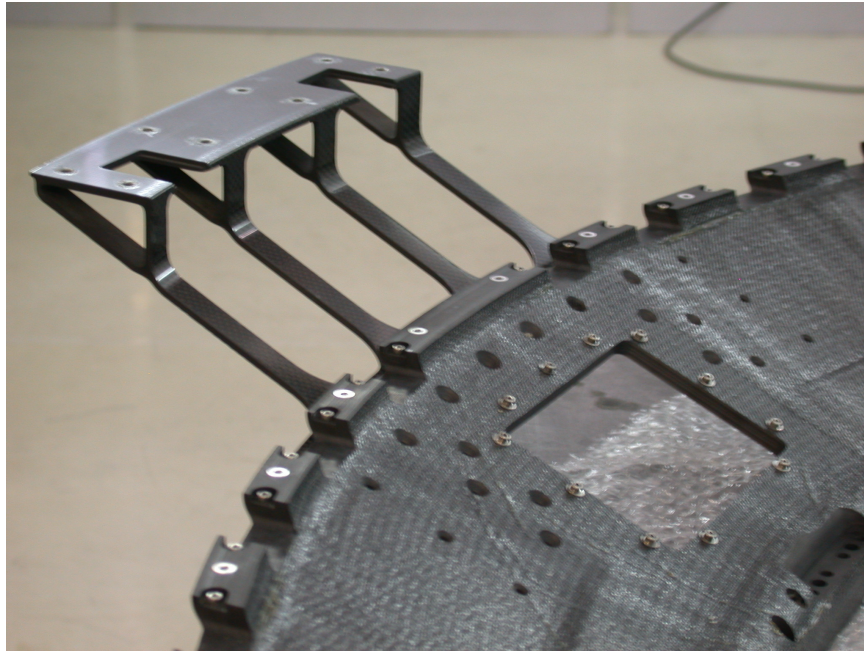
- Add some cable clamps on the back of hybrids



Work on conical flanges

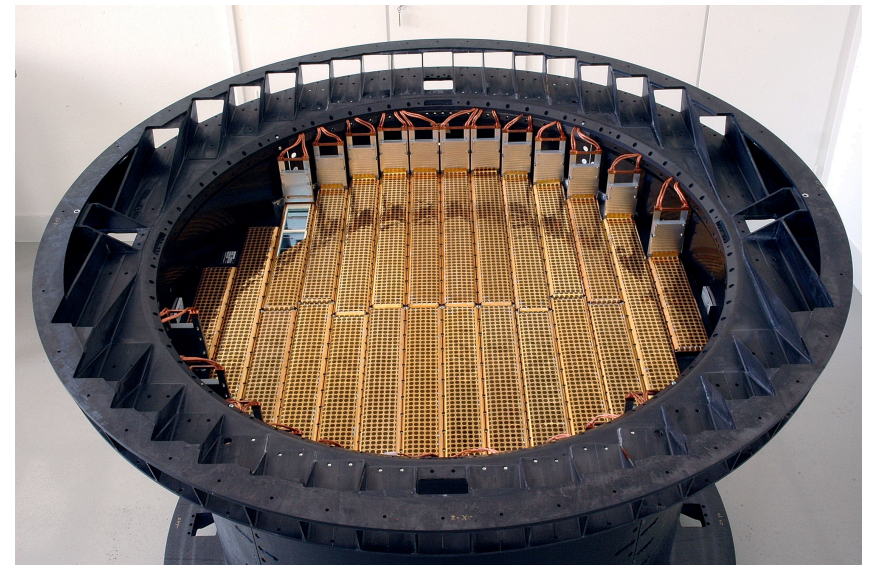
- Adjust and bond cable grommets

- Bond Star Tracker lower support



Remainder:Model

- Model is ready for shipment



# AMS Cooling-Evaporators

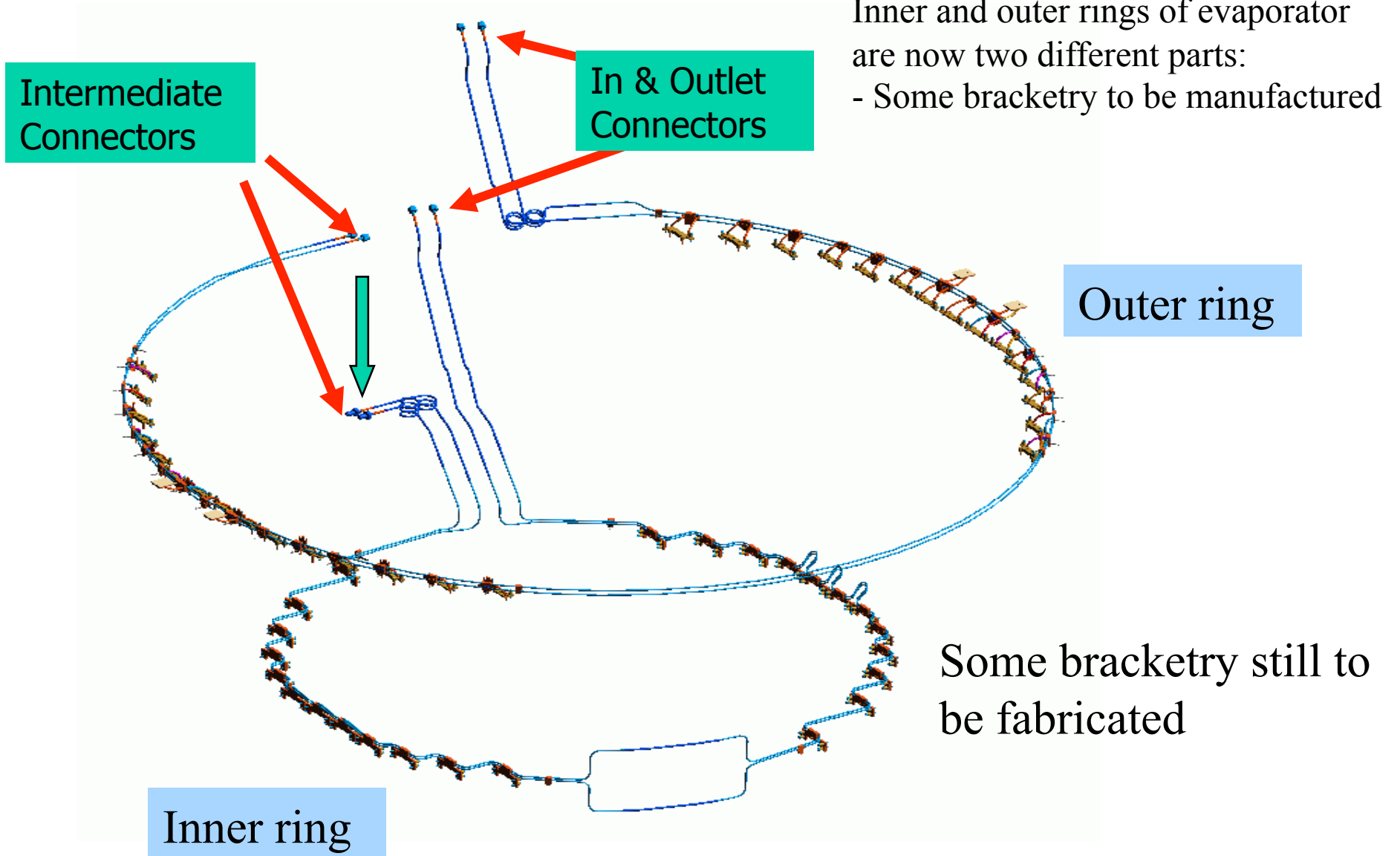
## Minutes of a meeting at Nikhef (Amsterdam) 11.10.06

Part takers: Nikhef: E. Berbee, Ir.R. Klöpping, B. Verlaat , Uni-GE: F. Masciocchi, E.Perrin

### Status and tentative work plan with the loops (or rings):

- The top Inner and outer loops complete, leak and pressure tested, but with temporary Cajun VCR fittings will be delivered from Nikhef to CERN for the end of Nov 06.
- Uni-GE will perform a dry assembly in Dec to x-check mountability
- A Nikhef technician will replace the Gajun fittings (Orbital welding) by the flight fittings at CERN (or Uni-GE) after the dry assembly run.
- Interface verification between the installation tool (Antonio) and the “Nikhef spider assembly jig” to be done by UniGE.
- It is not foreseen yet to perform a dry assembly of the bottom loop. This may be revisited after the top loop dry assembly.
- The bottom loops to be tested with CO<sub>2</sub> at Nikhef in February-March and delivered to CERN immediately after.
- EP to ask Antonio to x-check all simulations have been made to the pipe extensions
- Uni\_GE to verify interface between “Nikhef spider assembly jig” and the TAS system.  
And compatibility with cabling of P1 resp P5
- A list of missing parts has been established, missing brackets need to be re-designed and one re-calculated (BV).  
Fabrication will be done by Uni-GE.

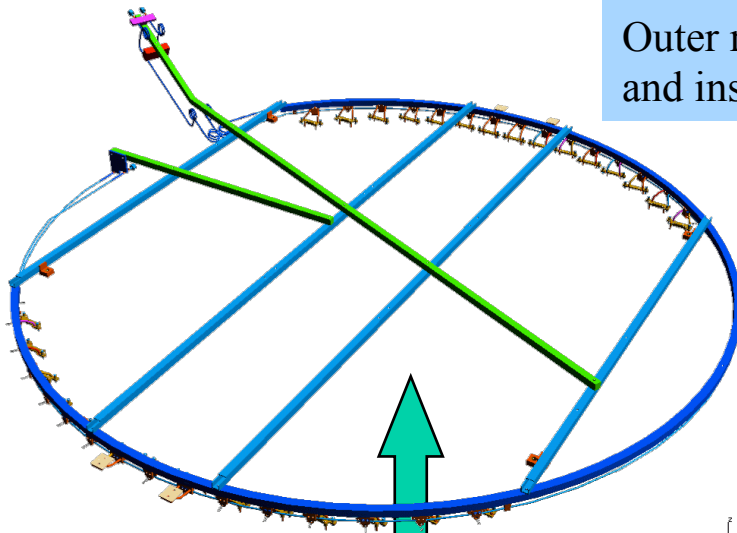
# Evaporators status (Nikhef - UniGE)



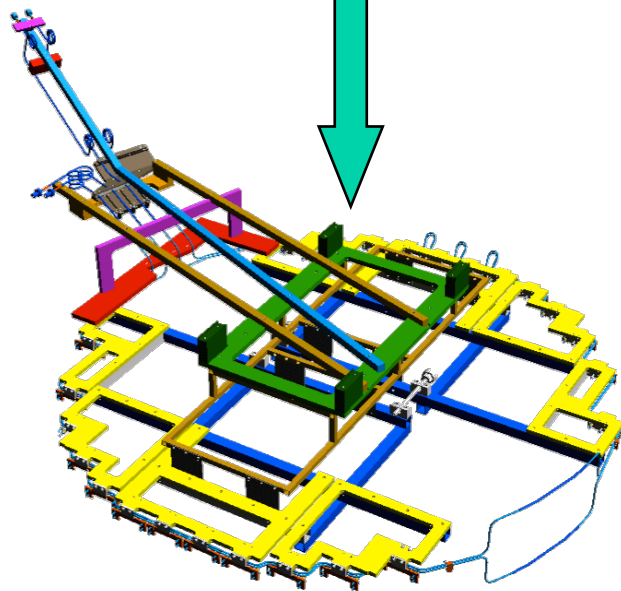
Inner and outer rings of evaporator are now two different parts:  
- Some bracketry to be manufactured



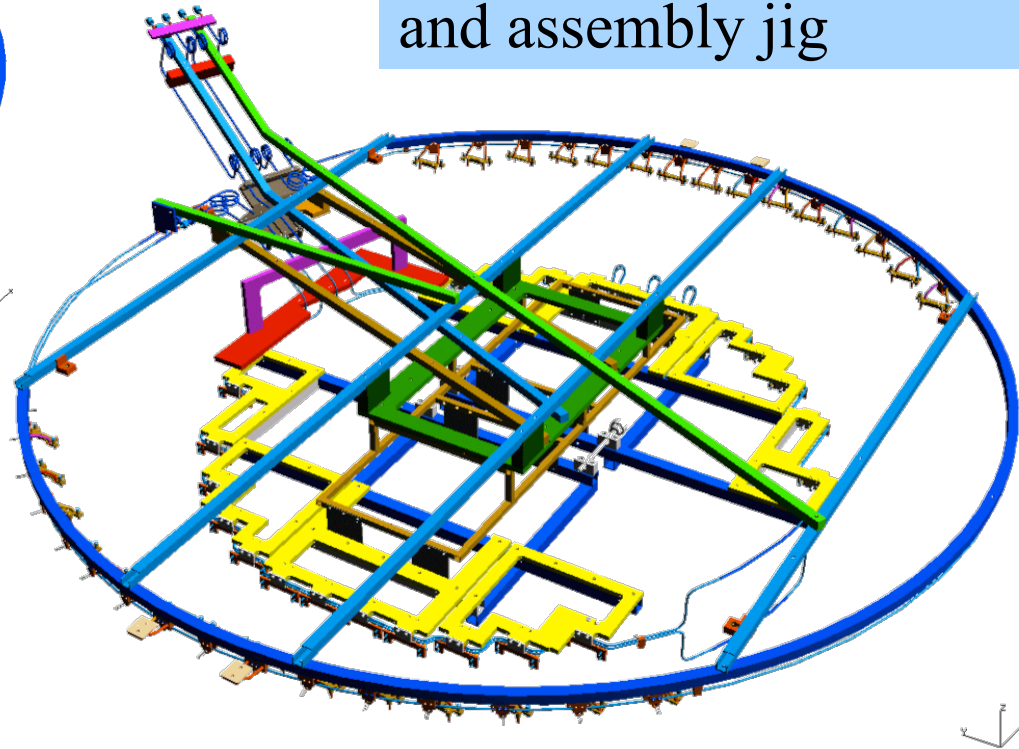
Cooling loops are not self supporting and need jigs for fabrication, storage, Transport and assembly



Outer ring assembly and installation jig

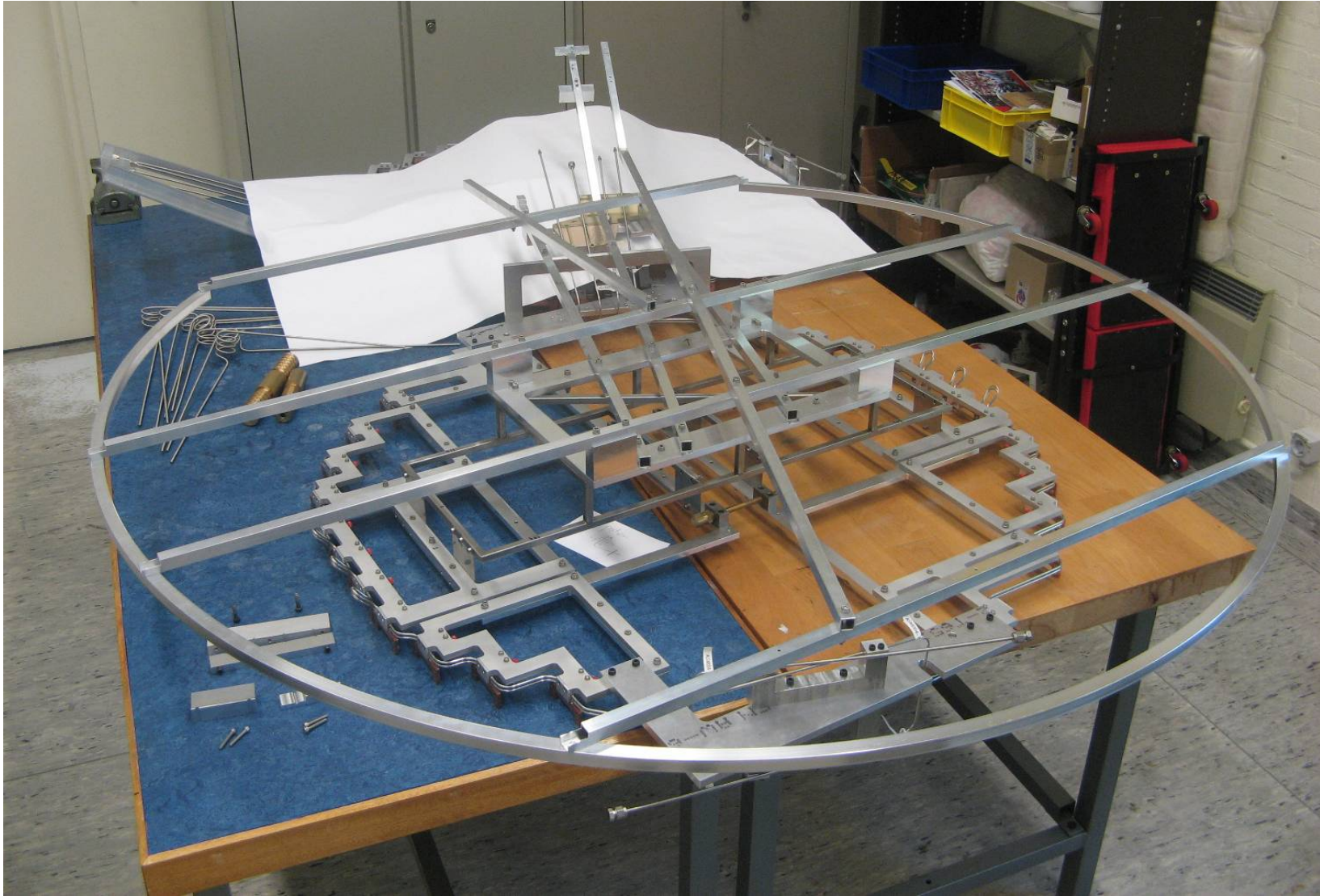


Inner ring assembly and installation jig



Complete installation and assembly jig

# Evaporator rings in support structure at Nikhef

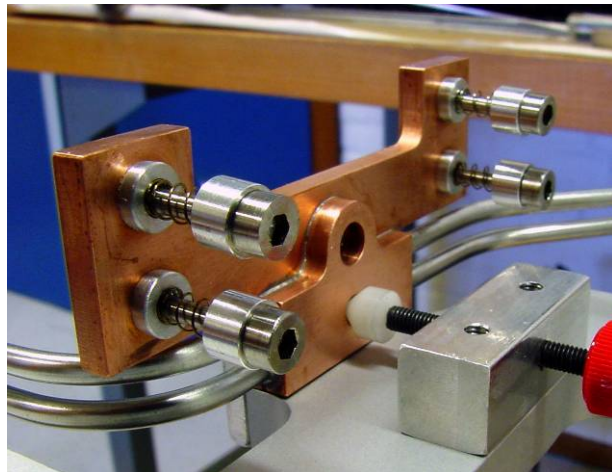




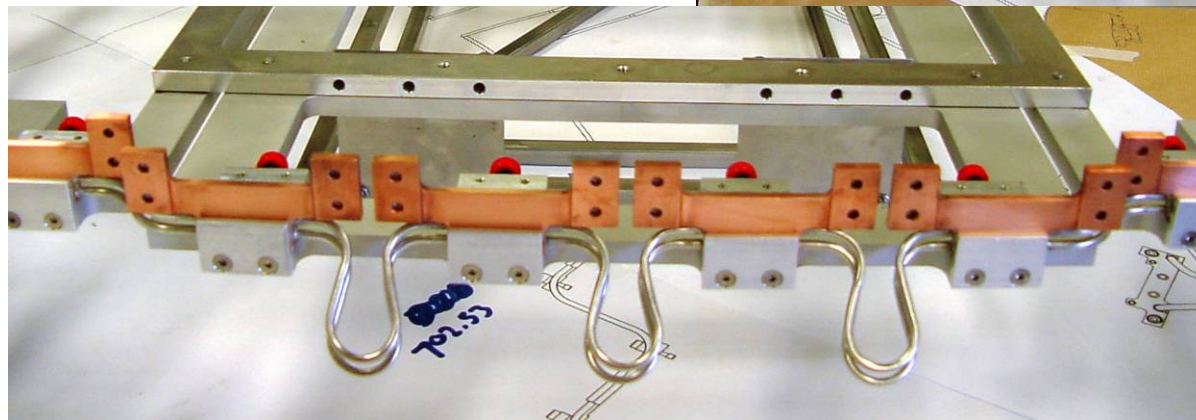
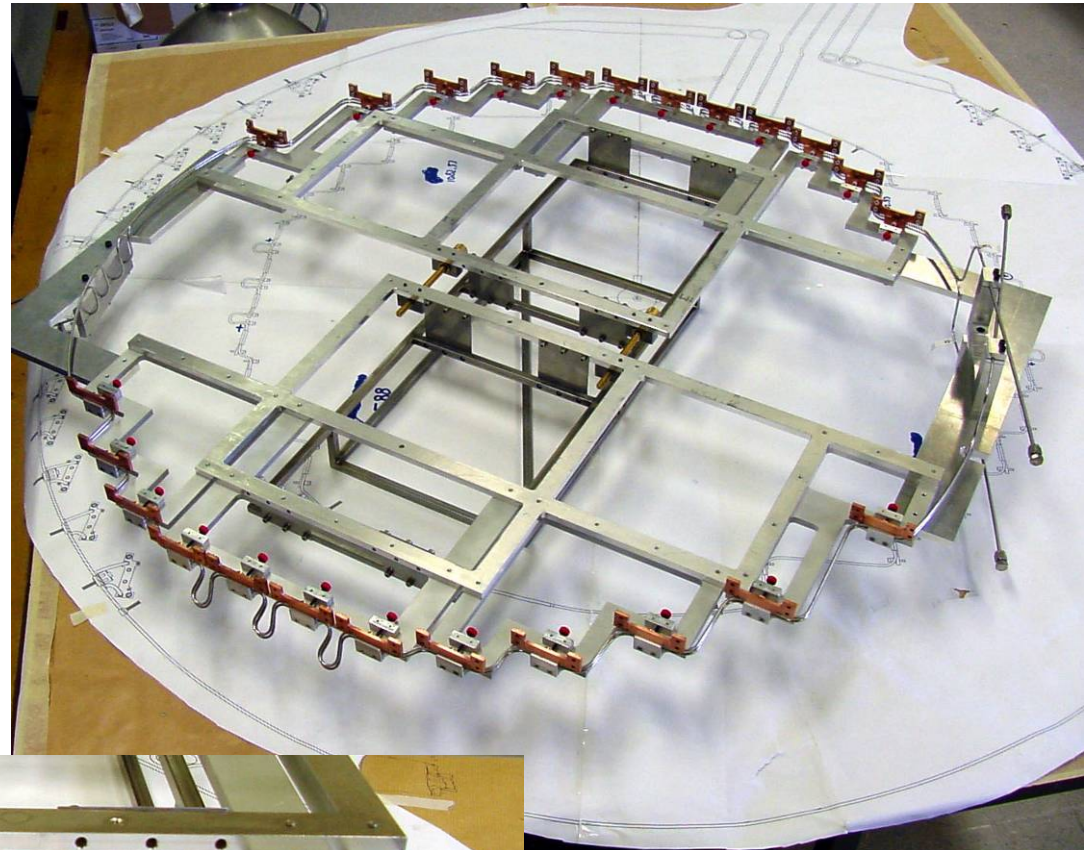
# Evaporator status (Nikhef - UniGE)

Complete inner ring

Inner ring production at Nikhef



Copper block details

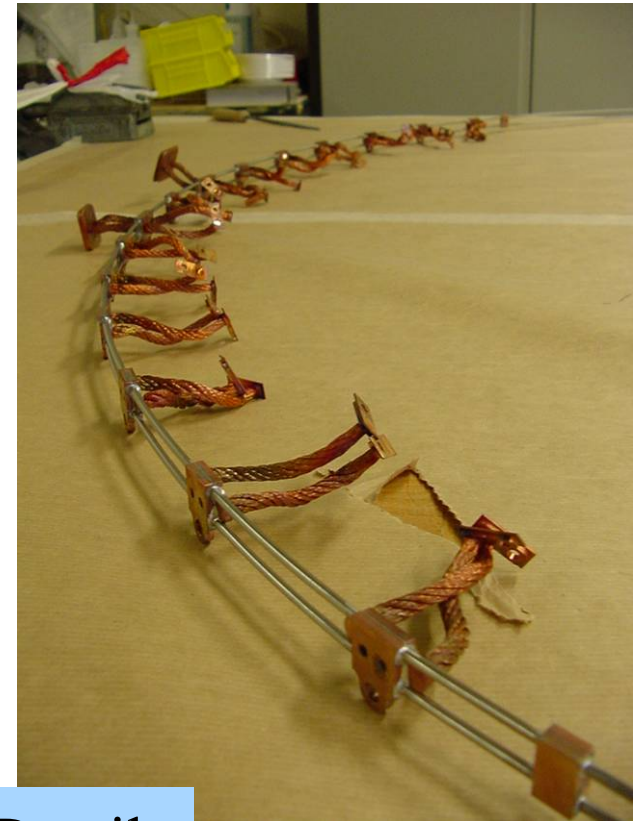




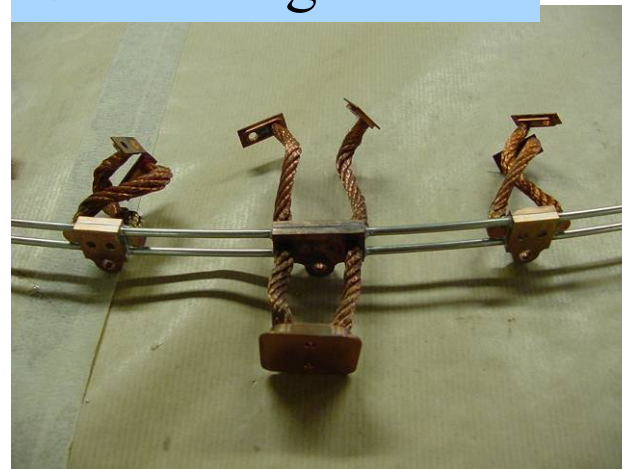
# Outer ring production at Nikhef



Outer Ring Assembly and soldering jig



Outer Ring Details

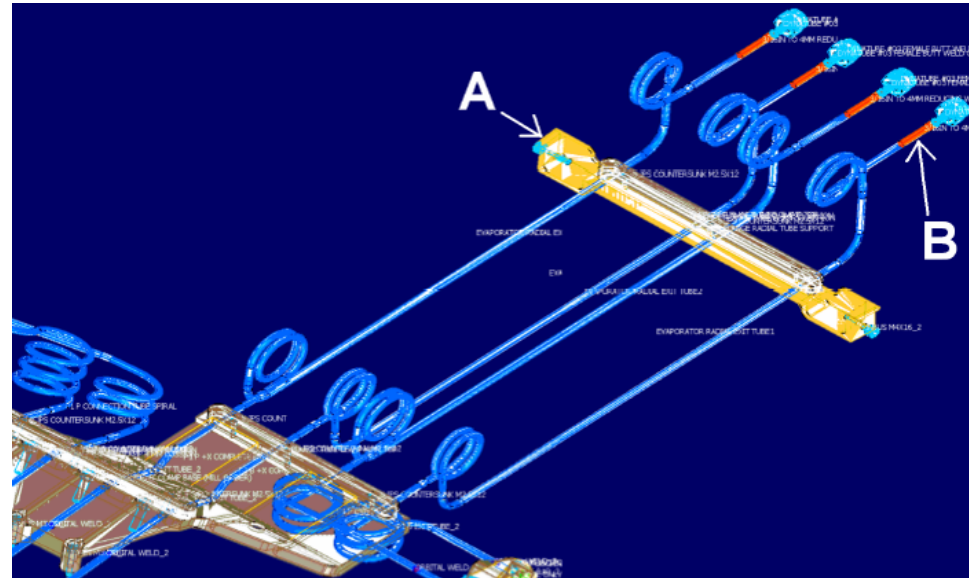


Connections of  
evaporators to the TTCS  
have been redesigned  
and recalculated

*Bart Verlaat*  
*Antonio Alvino*

Drawings of missing parts  
by Bart.

Fabrication in Uni-GE



Redesigned radial  
connector tubes with  
extra pigtails

## Summary of future operations at UniGe

It is now important to schedule these operations and avoid to many cable handling

- Mounting of the shell sectors
- Star Tracker lower support bonding on top Conical flange
  - *Procedure exists, work scheduled for W 44, 45 or 47? Tbc*
- Tracker test of a full octant connected to a complete crate ==> Nov 06
- TAS system testing at Geneva ==> Nov 06
  - *Detail of modifications to cable temp supports to be agreed with Wolfgang*
- Top inner evaporators pre-assembly with Inner Tracker ==> Dec 06
- Outer evaporator pre-assembly on plane 1
  - *Availability of P1, some extra tooling may be needed*
- Completion of P1 ==> Dec (*storage in Nitrogen*)
- Packing (*in Nitrogen*) the inner tracker in a box convenient for storage and transport to CERN.
  - Procedure to mount evaporators on P1&P5 to be revisited
  - Outer plane container not compatible with evaporator installed.