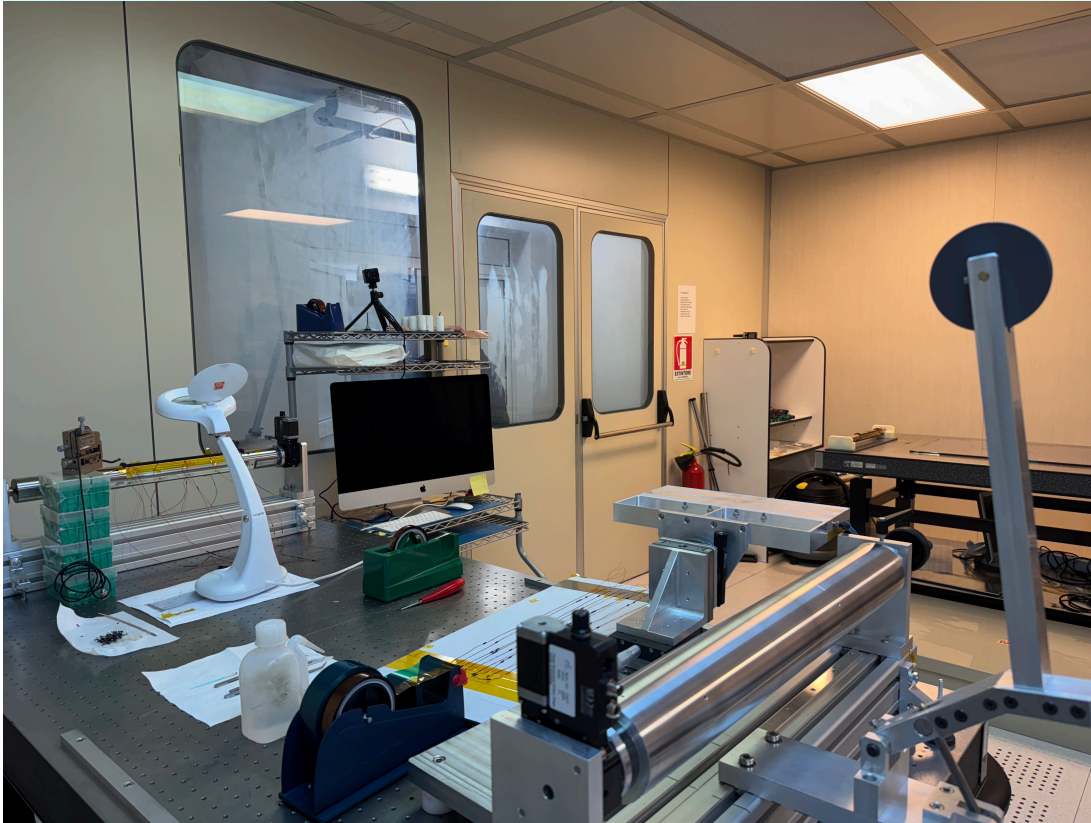


Visit to Bari and Trieste

Barbara Jacak

December 17, 2024

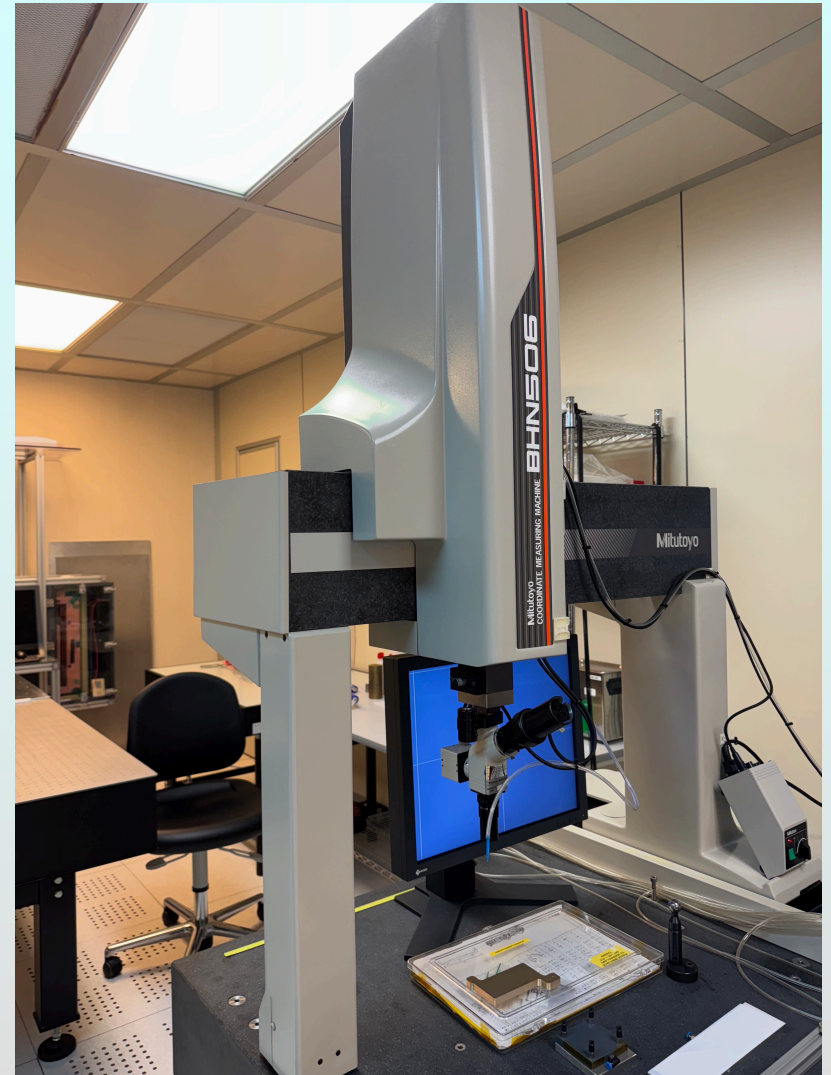
Bari labs



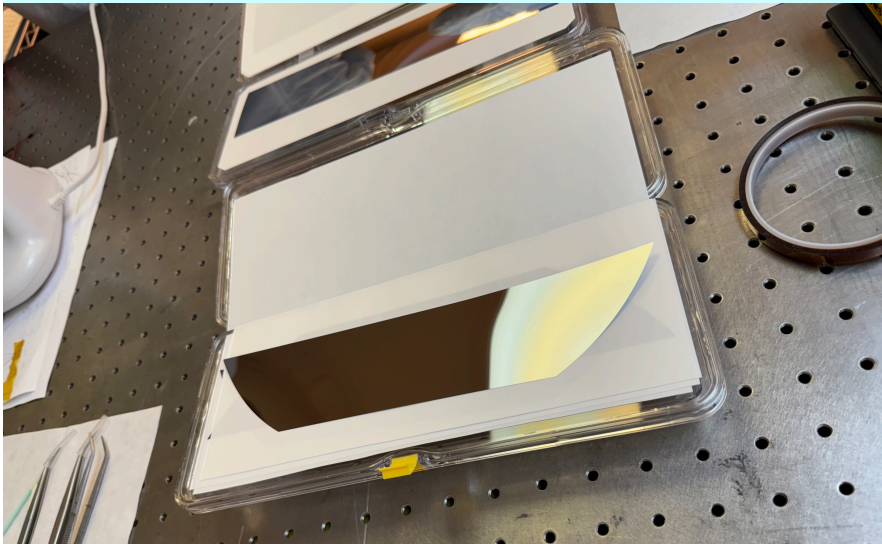
Hosted by Domenico Elia, Domenico Collela,
Rosario Turrisi from Padua

Met several Bari technicians

They also have sensor characterization lab

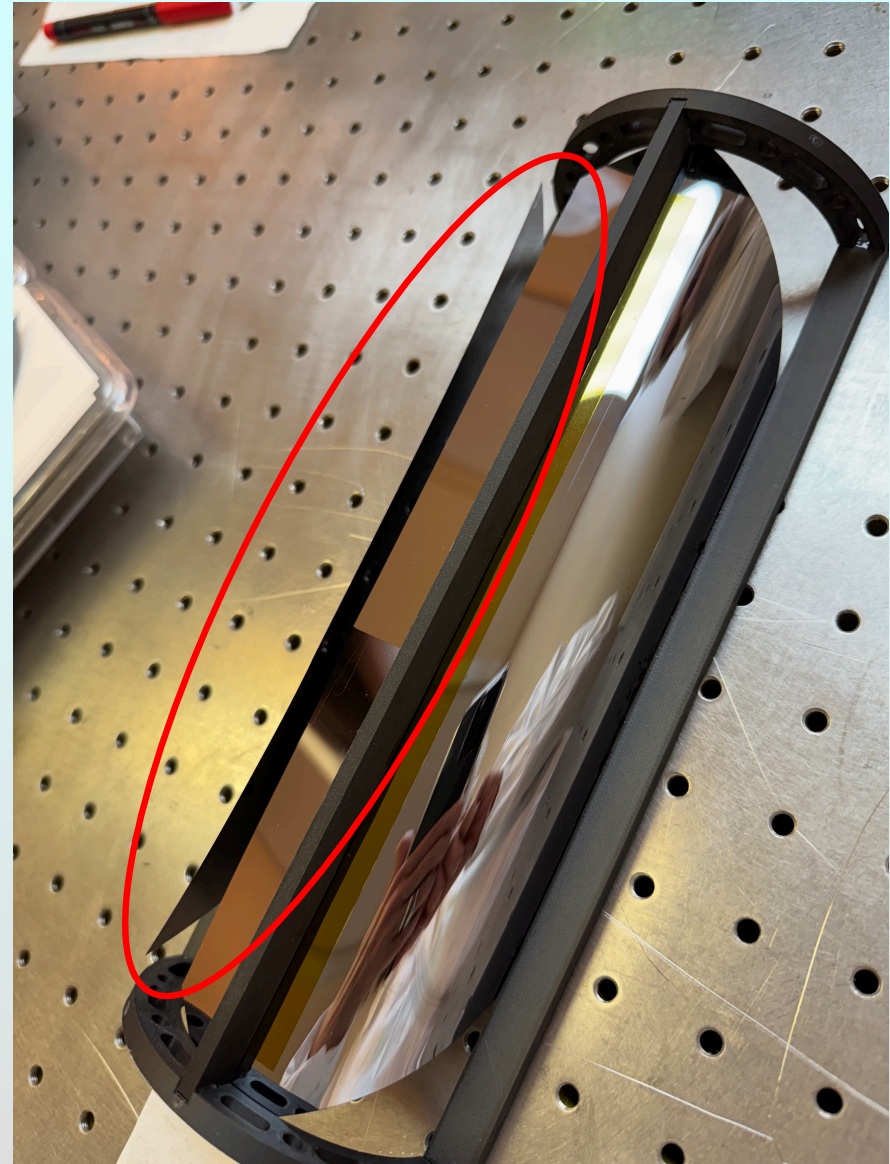


Bending wafer-scale dummy silicon



Dummy silicon

Backing removed using custom tooling at CERN
Can see its tendency to bend on its own



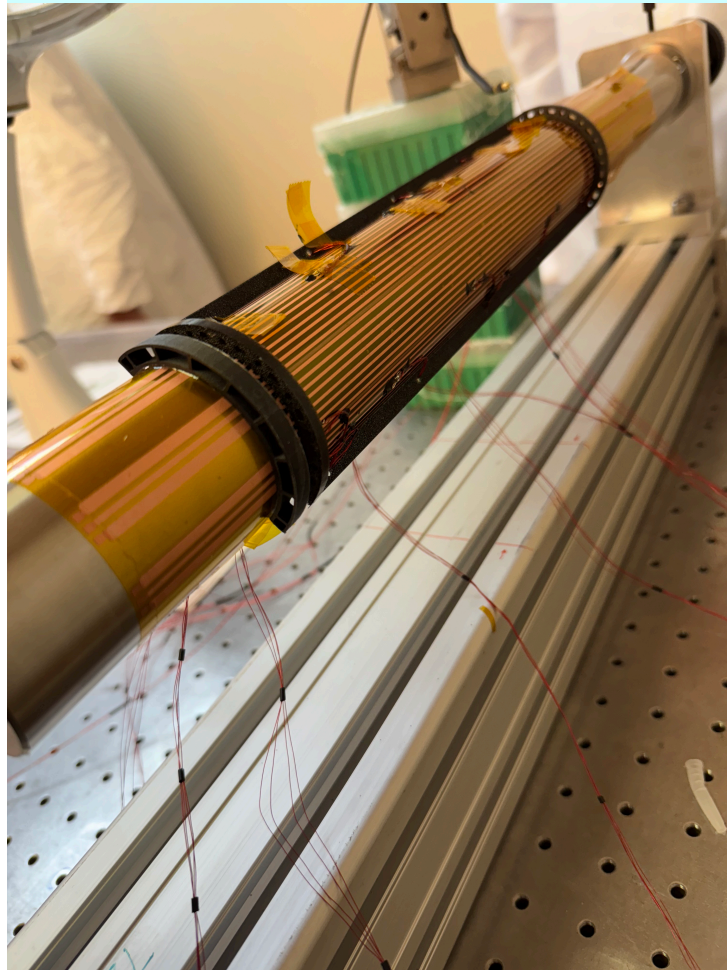
- Single sensor strip bending (for ITS3 L0) successful
- For two sensor strip bending:
lay side by side and tape
attach to C fiber frame
longeron supports taped seam
- First attempt not successful
sensor broke
note crack; starts at taped edge
- NB: thickness of longeron!
Will attempt to make it hollow

Some questions

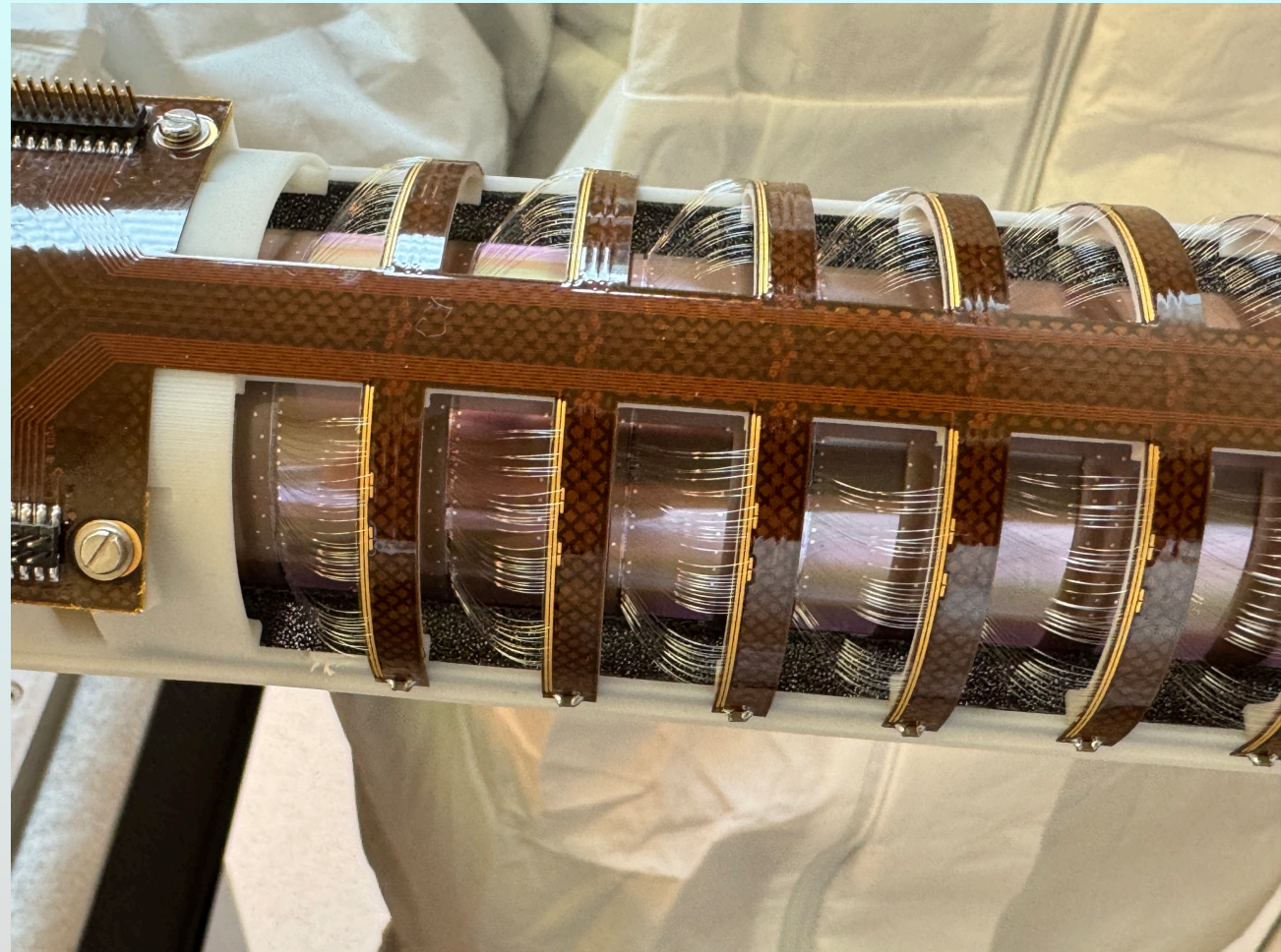
- **How thick a longeron (rib) can we stand?**
 - Supporting sensor seam is likely necessary
 - Different rib thickness outside of L0,L1 vs. L2?
- **What level of geometry detail is (or can be) simulated?**
 - Can we put a material budget to the longerons?
 - How much detail do we want for power & readout cabling?
 - @Shujie: what info do you need from Bari/Padua?
- **L2 will use 4 stitched sensors. 3 longerons?**
 - NB: Bari aims to solve L0 bending by January ePIC meeting
 - Put together two quarters to make L2 half barrel?

ITS3 prototypes

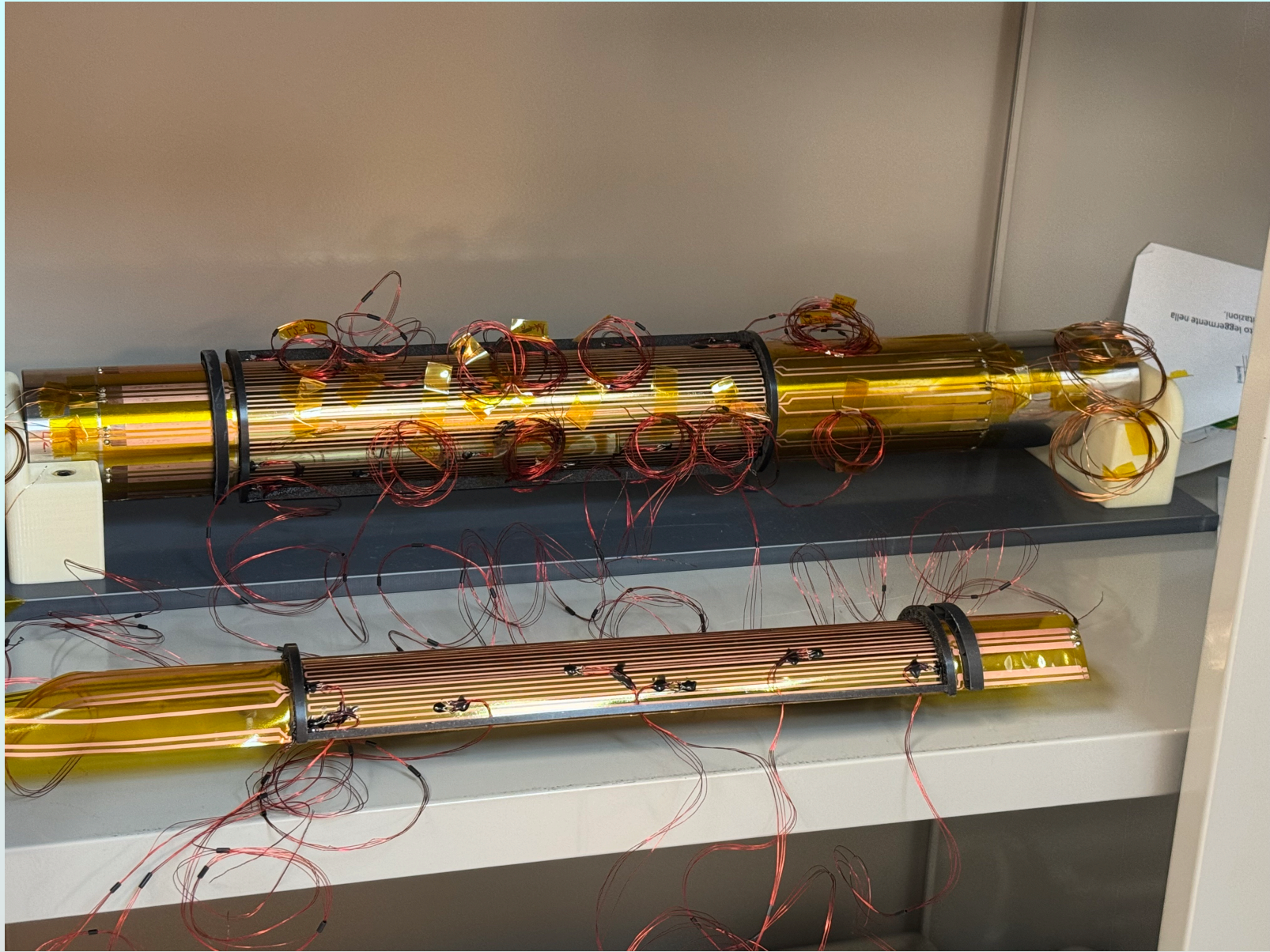
For temperature testing



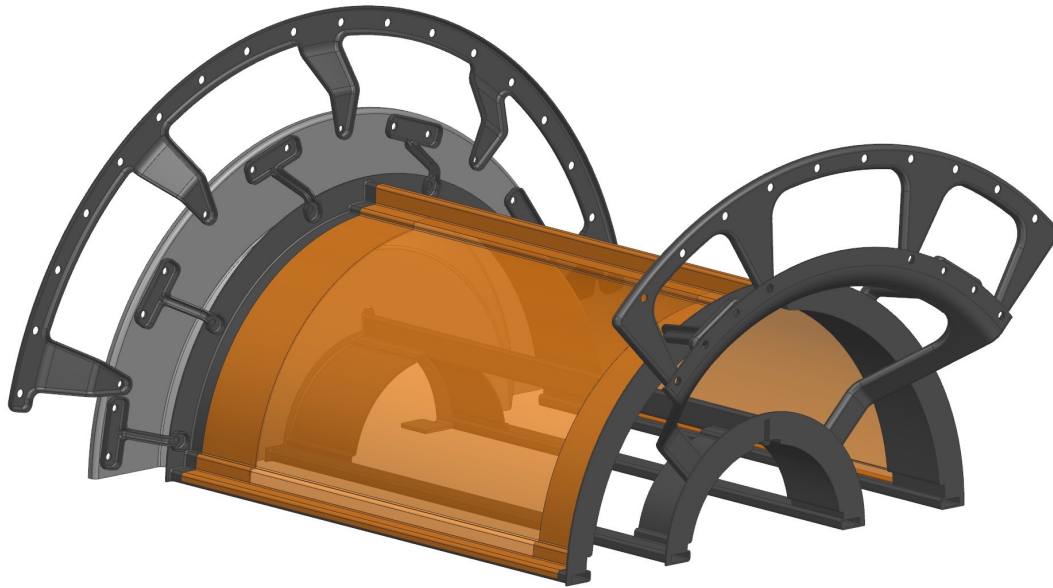
FPC wire bonded to sensor



ITS3 L0 and L1



ePIC Inner Barrel design (from Rosario)



Support structure & Kapton “shield”
Shield idea: air containment & protection

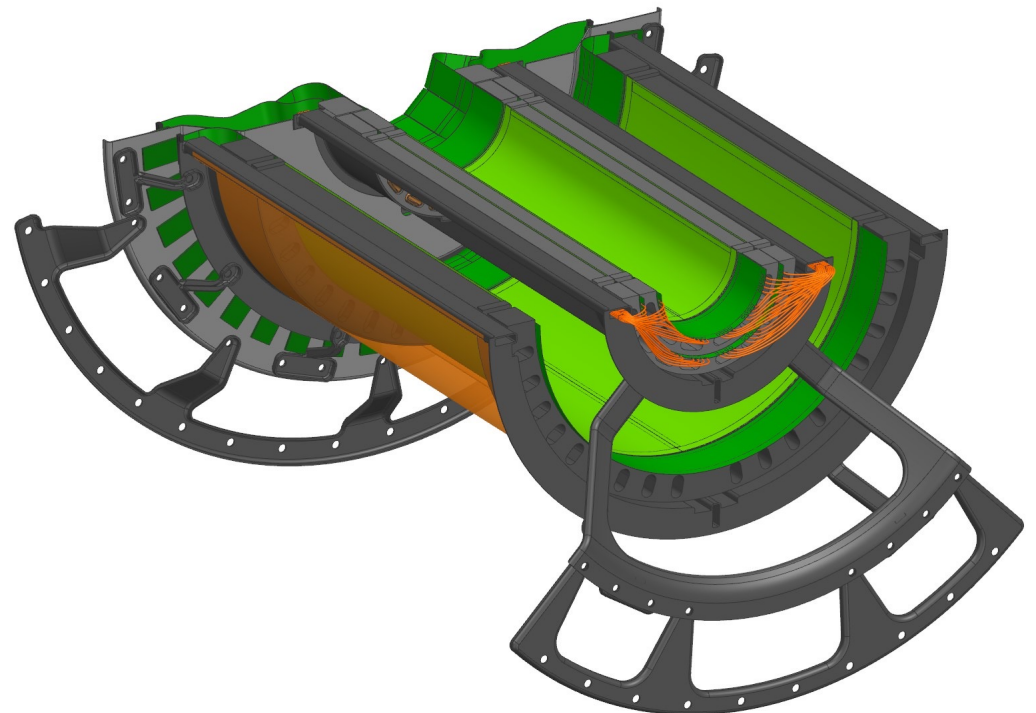
We discussed minimizing material & they will rethink shield & longerons
*How thin can shield be? 20-30 μm ?
Non-rigid if air containment is goal?*

With sensors & FPCs
Orange power cables snake thru endcap holes

thickness shown: Ohm’s law

*WP3 will design these?
effects on air flow?*

NB: I think these do not show most up to date dimensions

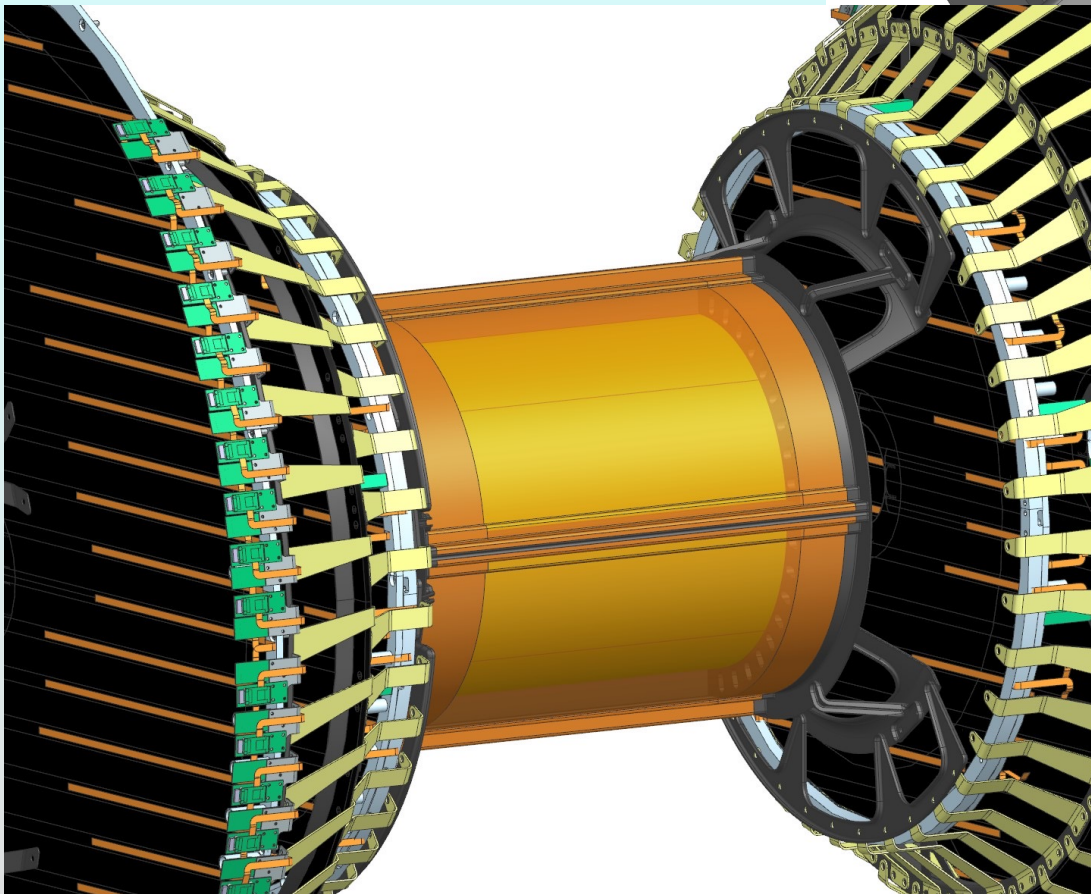
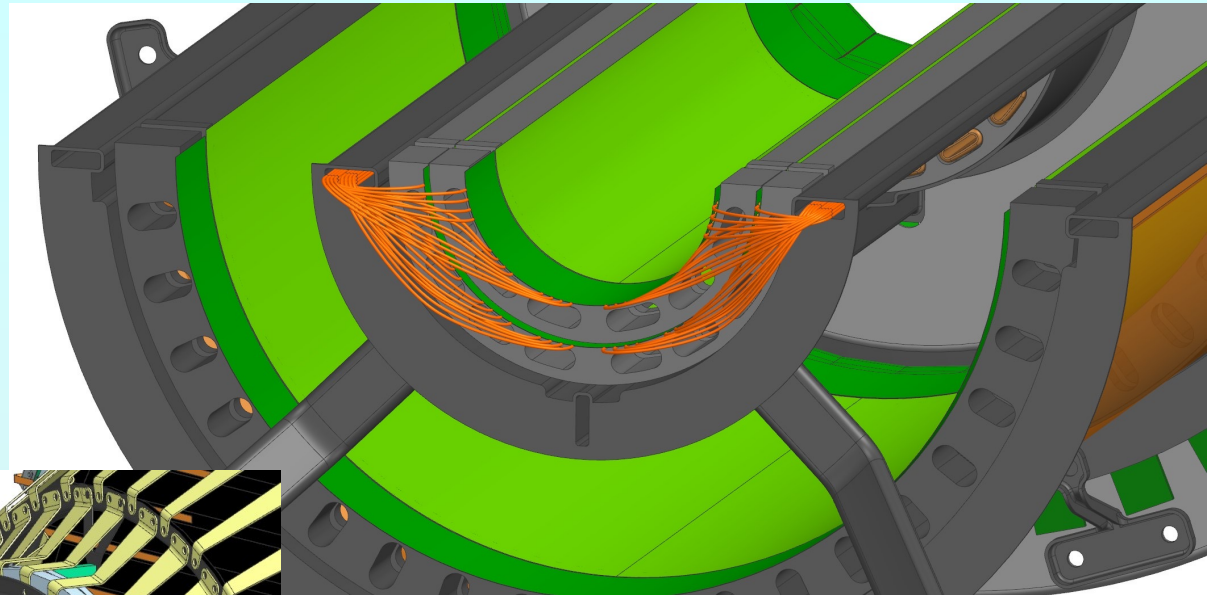


Cabling design details

Padua will put FPCs into Cad model

Zhenyu, please discuss electrical connections w/ Bari & Padua

Power cables @ 1mm Cu: thick!
Other options? Wireless power?



With inner 2 disks each side

What is cone thickness & design?

Who is doing cones? Purdue?

What are the yellow tabs?

What are they made of?

Cooling questions

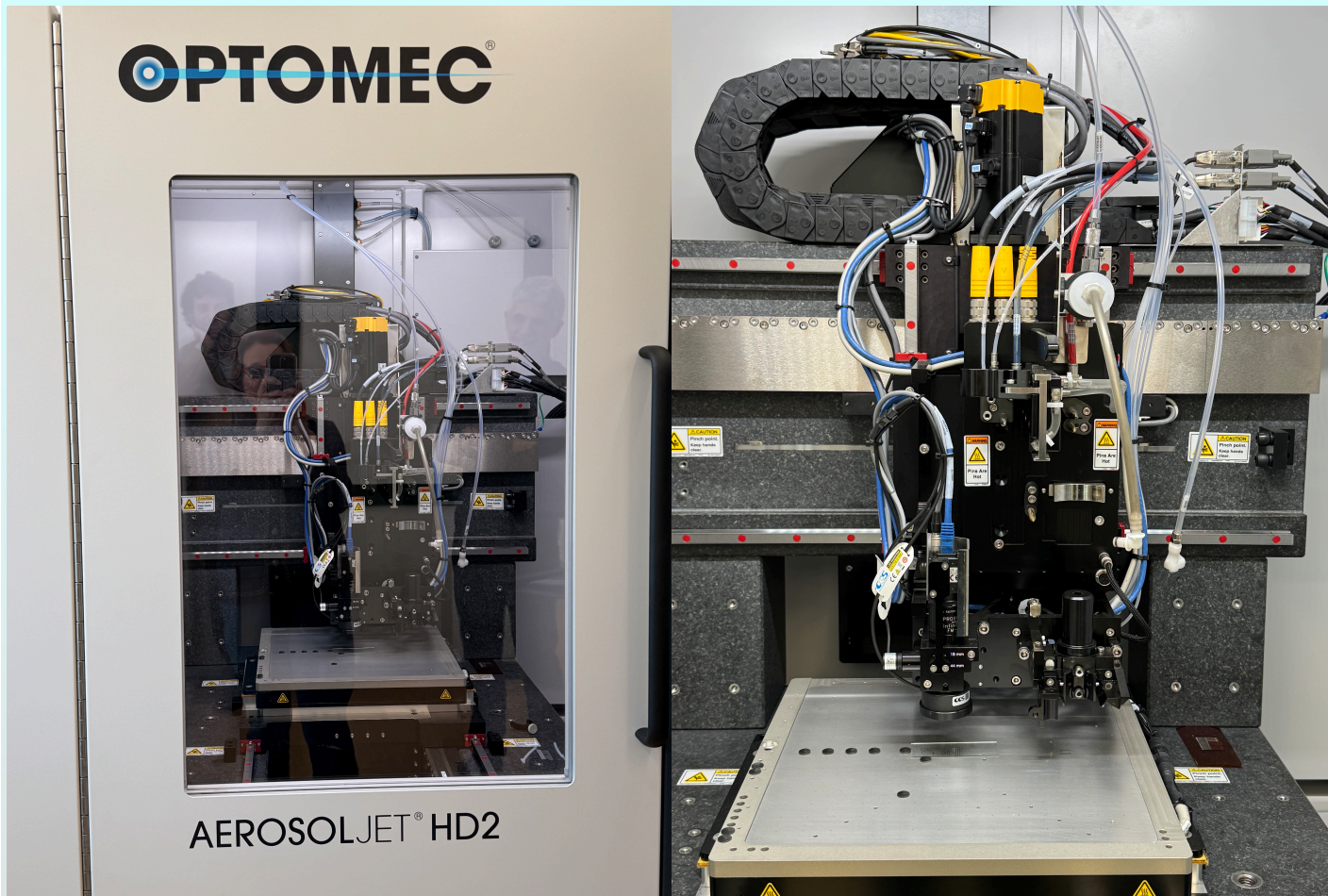
- How does the cooling air leave the barrel?
- The endcaps should have their own cooling system
ITS experience says separately controlled subsystems are important for performance & troubleshooting
- ANSYS simulations should be independent
Inner barrel should include L0,L1,L2 + 2 disks each end
Padua engineer simulating barrel, will send results
Can we deal with “step files”? Or read drawings?
Emma agreed to help; cross check barrel & do endcaps?
- How to remove the heated air after cooling inner barrel?
Air goes in on h-going side and “out” in e-going side
- Padua studies indicate: 8 m/sec (12 mi/hr) air flow for 30°C at sensor, or 40 °C in the worse case
- What is the humidity in the STAR hall? (ans: 20-45% RH)

At Trieste

Met with Laura Gonella, Giacomo Contin, Silvia Dalla Torre

Toured lab, especially the aerosol printer for electrical traces (R&D project!)

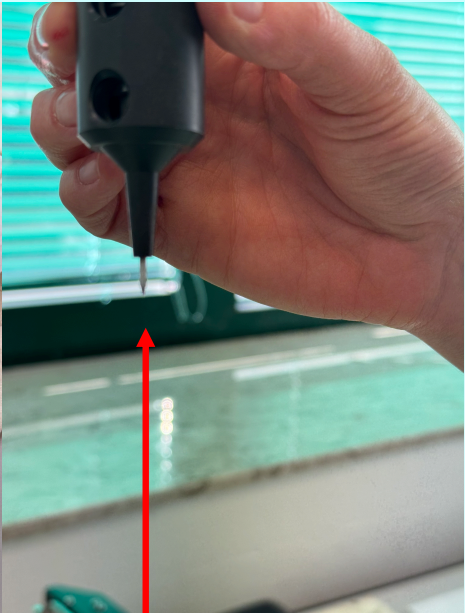
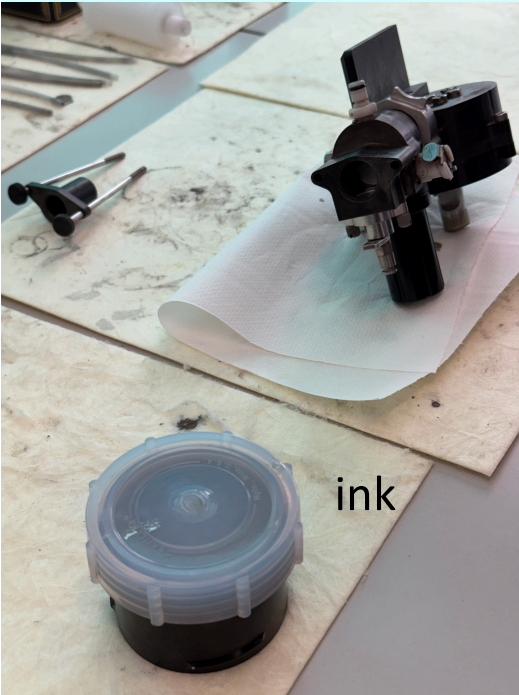
Discussed general SVT issues with Laura & Silvia, especially BNL legal, procurement delays
has attention of BNL Director; handshake issues with BNL site office



Optomec machine runs!
R&D ongoing to optimize
hired dedicated tech
Need new ink source
Have many projects
beyond ePIC for this

Optomec based in
Albuquerque, NM
3 machines in Italy

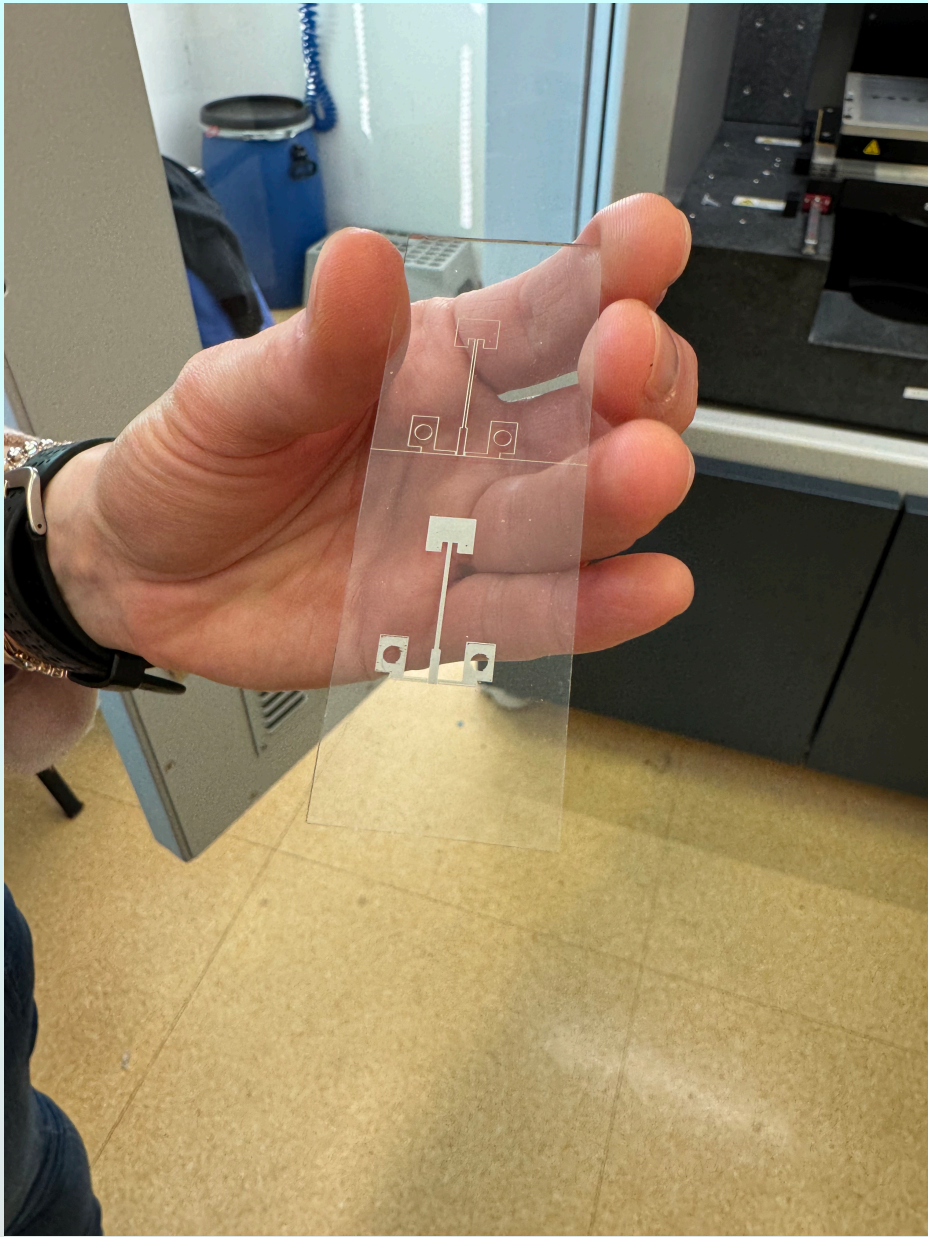
The parts



\$30K



The results, so far



Big issue: Layer 2!!

- needs design work already now!
- Sensor joining and bending needs R&D now!
- Integration with rest of inner barrel is crucial

backup