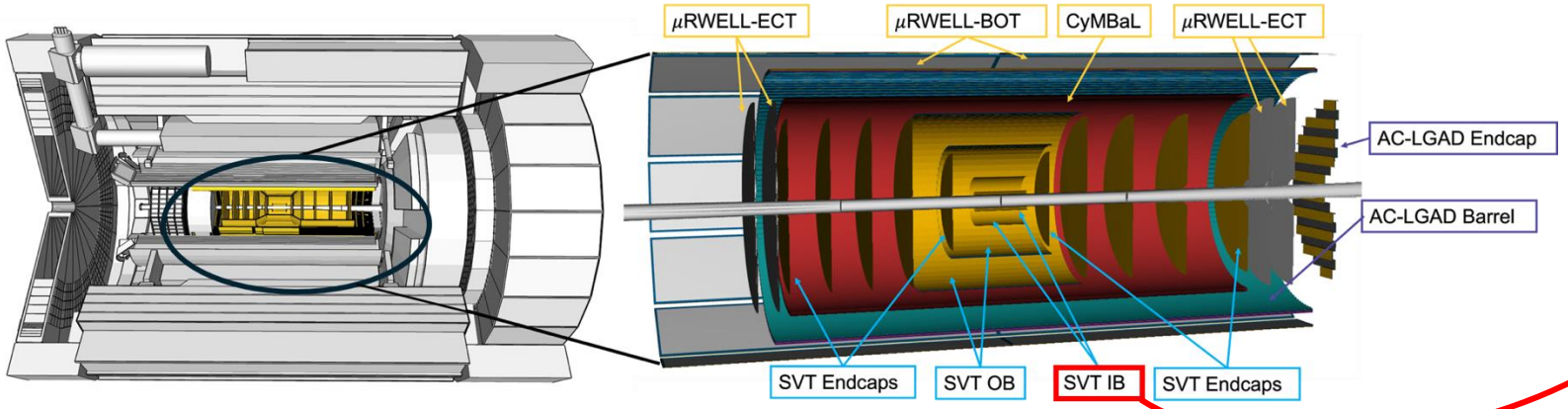
SVT Italia: status and perspectives

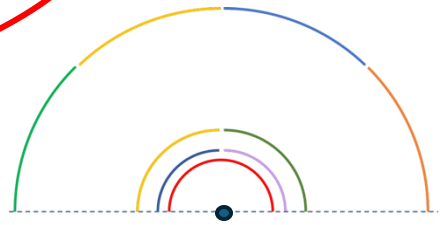
Rosario Turrisi

The SVT IB

Silicon Vertex Tracker Barrel



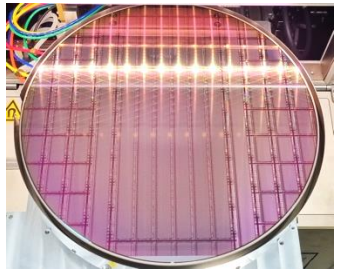
SVT-IB (L0,L1,L2):
Silicon Vertex Tracker – Inner Barrel
Three layeers, currently INFN is in charge of L0,L1
NB L2 under consideration

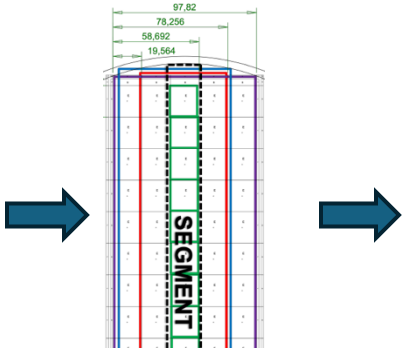


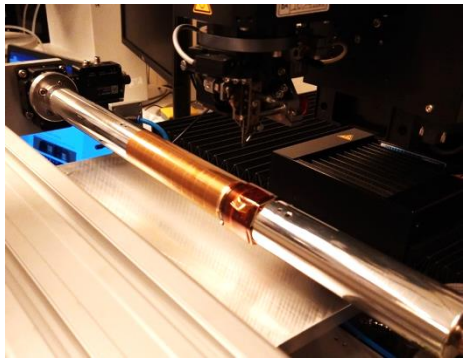
L2 (4 x sensors)	**r = 126 mm**
L1 (2x sensors)	**r = 50 mm**
L0 (2x sensors)	**r = 38 mm**
beam pipe	**r = 31.75 mm**

Sensors: MOSAIX ALICE-ITS3, 65nm TPSCo, bent to cylindrical shape

- Silicon thickness 50 μm
- Pitch 21 × 23 μm
- 40 mW/cm^2 power dissipation, transducers ~1600 mW/ cm^2 (LEC)
- 0.07% X /X_0 (Si+metal layers)
- ~ 1.9-3.2 g Si/sensor (L0-L2)







INFN in ePIC - SVT

Groups:

Group	FTE - PEOPLE **2026**	
Bari	4.6	15
Padova	2.5	9
Pavia	0.9	4
TIFPA	1	4
Trieste	1.1	4
TOTAL	10.1	36

New!

All groups have a participation in ALICE (not always the same people):

- synergy partially stated by CSN3 (financial)
- On the field: very useful share of experience, beneficial for both sides…

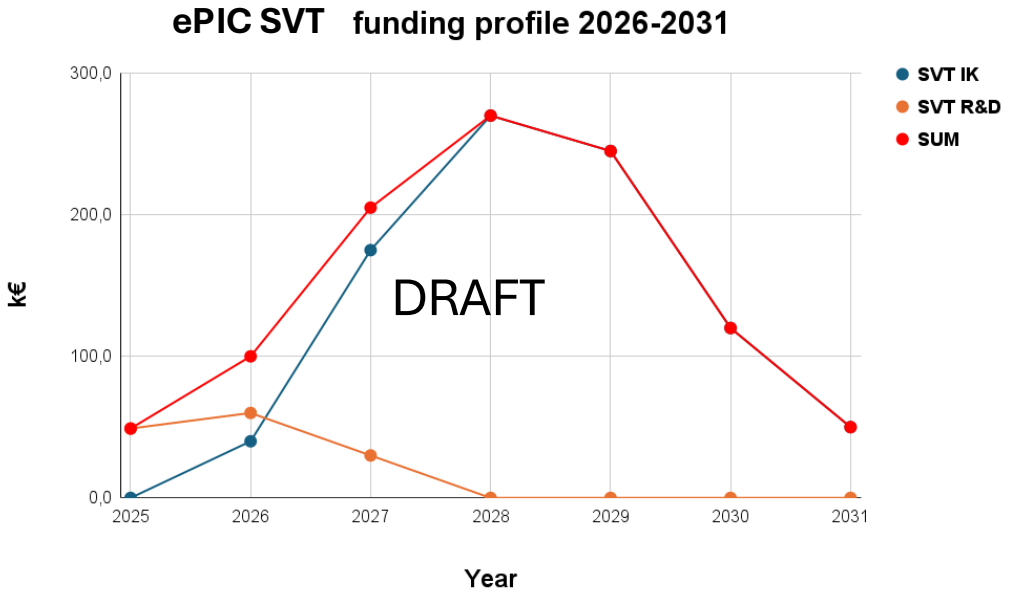
average: 0.28 FTE/person overall (i.e. including tech researcher, phd, postdocs…)

Roles

- D. Elia, RN, SVT layers and discs subsystem co-cordinator
- L. Gonella, SVT technical coordinator
- R. Turrisi, SVT Italia coord.

Joined UniTs and INFN-Ts Sept 2024
Welcome!

Welcome to Enrico Serra and colleauges from TIFPA!
TIFPA joining with 3 staff and 1 PhD
Joining official DB starting 2026



Still ~3 years of R&D, end when other projects could start in CSN3

Where are we (going)?

- Our deliverable (as of today): L0+L1+? on global support

Final sequence:

WIP

Lots of testing due (see MT Camerlingo talk)

Still few critical details to be defined

Setup for dummy assembly ongoing

A piece of art deserves proper treatment…

Those arrows mean **lots of testing**: electrical, thermal, mechanical, integration…
and FEA simulation! (see E. Serra talk)

Main goals 2025-2026:

2025

bending procedure definition
dummy heat load tests
global support mock-up
climatic chamber tests
air flow cooling tests
detailed geometry in FEA software
modal & thermal preliminary simulations
L0/L1 shipping box prototypes

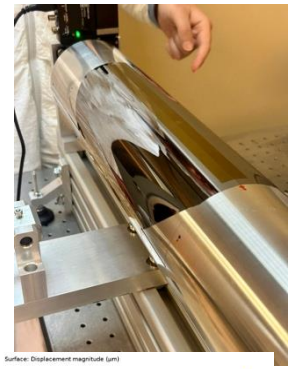
2026

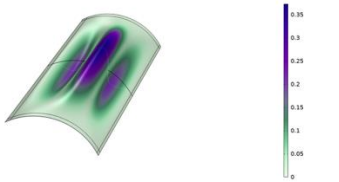
CFC global support protorype
final bending setup L0+L1 in Ba & Pd
IB prototype (with dummy sensors)
Wirebonder procurement (Pd, co-funding)
Thermal/modal FEA benchmarking with mock-up
wind tunnel tests

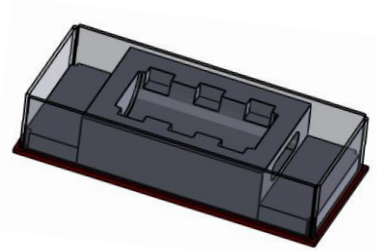
…and a lofty ambition:
L2

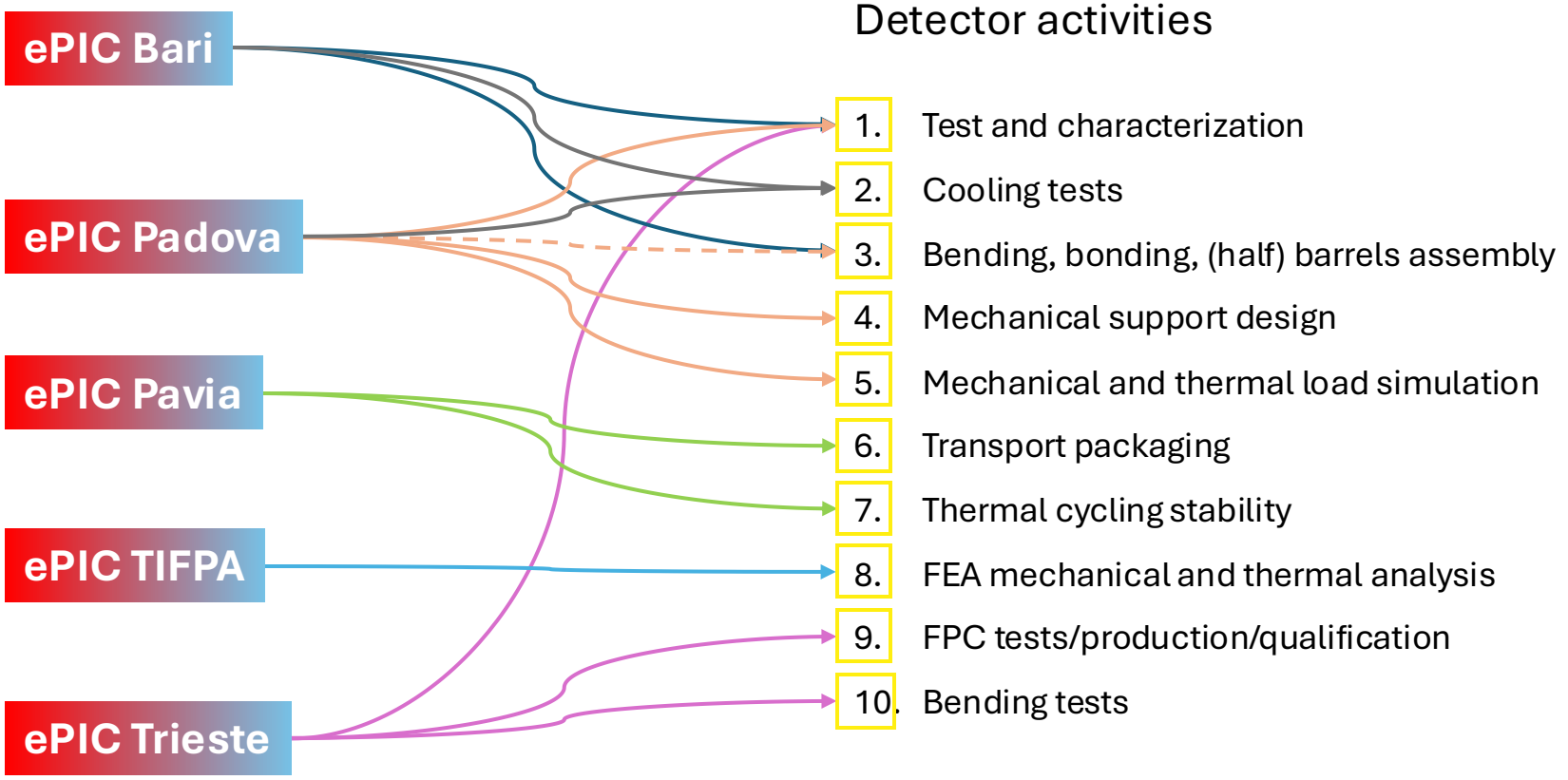
- support design
- assembly procedure

INFN sites in Italy and commitments





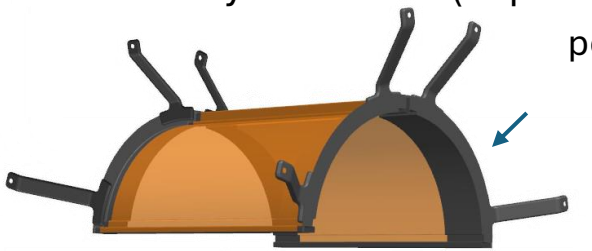




ePIC Padova

Support design & more

Current global support design, at best of our knowledge
- modificatios subject to better definition of services
- CFC bi-layer or fabric (depends on the part/position)



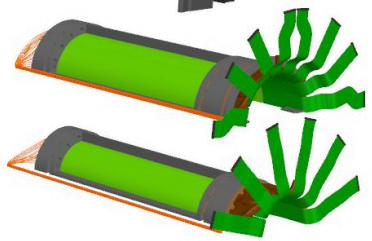
possible L2 support

L2

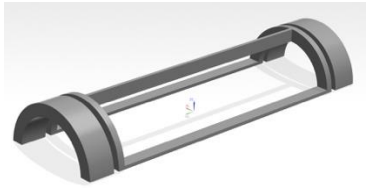
CFC L0+L1

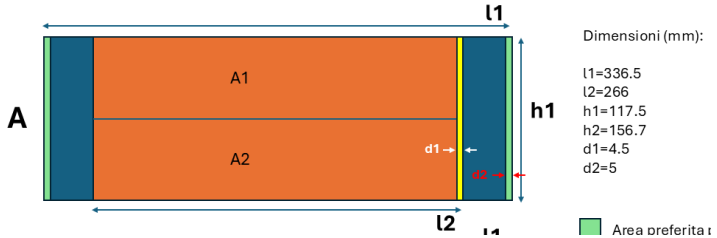
L1

L0

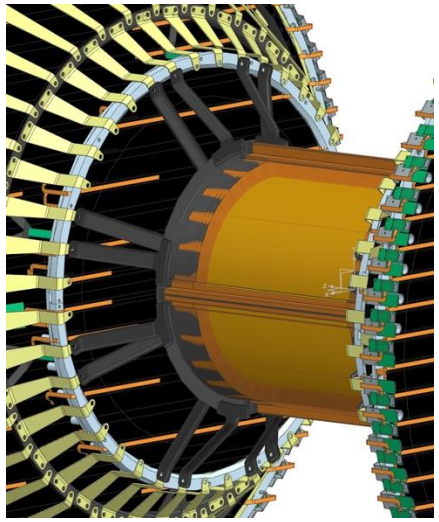


L0, L1 with sensors, cables and local mechanics





Integration with general support (in close coll. with BNL)

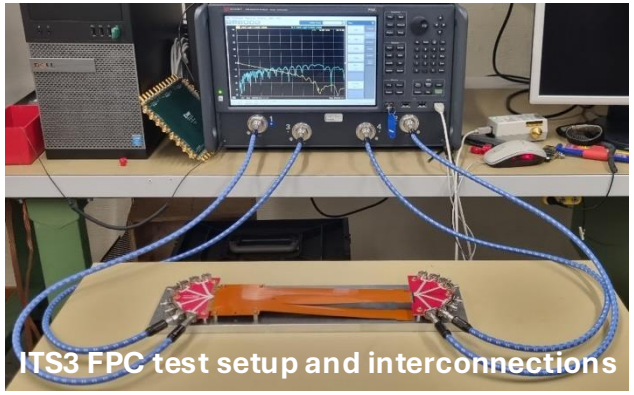


WIP
- alternative materials as LEC-side radiators
- dummy heat load test on L0+L1 mock-up
- 3D printed local mechanics

FPC test, thermal cycling, shipping

Setup for **FPC tests** (based on ITS3 system):

- Integrity test @ 10 Gbps
- Measure S-parameters (VNA) and eye-diagram test (high-speed test)
- Procurement ongoing, FPC from Daresbury
- Explore tab-bonding feasibility



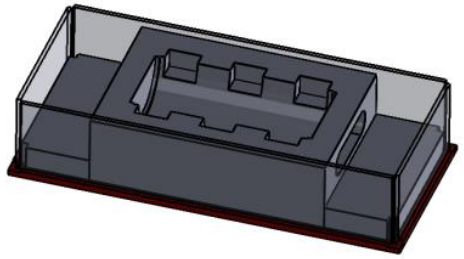
ITS3 FPC test setup and interconnections

ePIC Trieste

ePIC Pavia

- Cicli termici in camera cllimatia per test stabilità incollaggi
- Disegno e produzione scatole per trasporto L0(+L1) tra le sedi per test termici/meccanici

Model : Genviro 030LC
Temperature range : from -70 °C to +90 °C
Humidity range : from 10% to 98 %
Dimensions : 330 mm x 280 mm x 330 mm



Box trasporto con guscio in polimero e interno in polistirolo qualificato termicamente/meccanicamente

ePIC Bari/TIFPA

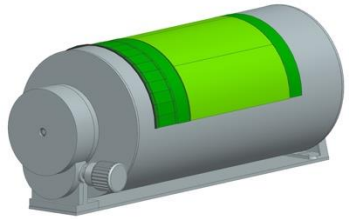
Can the shipping techniques used for artworks be of help?

- contacts with Dr. Michela Ulivi, exhibition manager at the Museo Nazionale di Palazzo Barberini in Roma

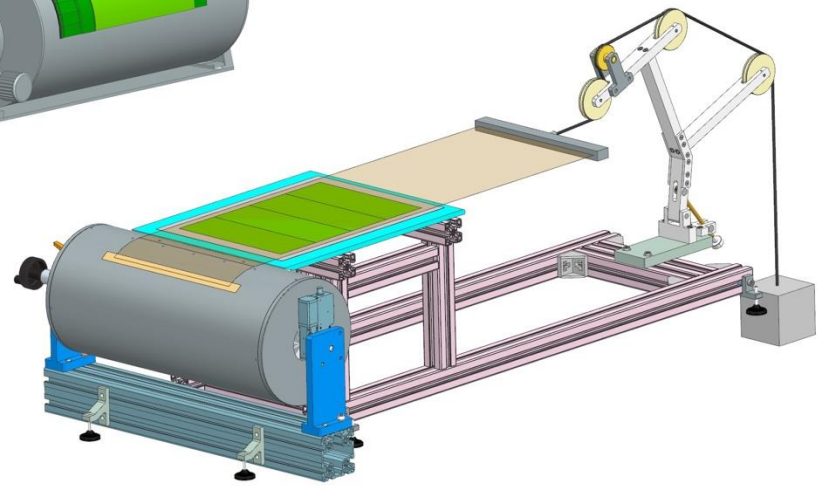
R&D L2 and cooling

There is not yet a procedure for L2 assembly
Support design is a guess from other layers design
We are exploring the feasibility of the procedure – should not be too far from L0/L1 – well tested in Bari, where details are being refined!

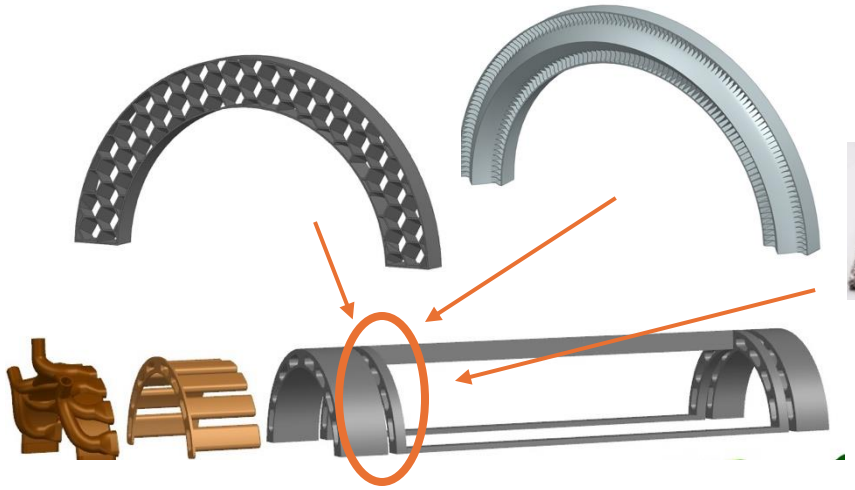
ePIC Padova

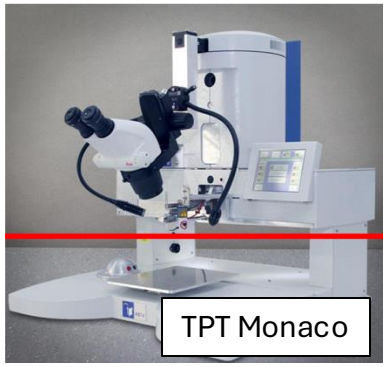


Mandrel for 4 5-segment sensors and sketch of a possible bending setup

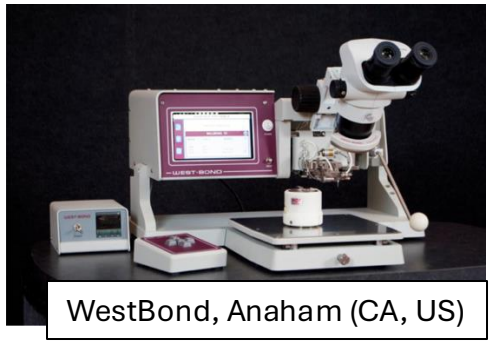


Cooling: the leap from 0.8 W/cm2 to 1.6 W/cm2 of the LEC can pose the question whether a cooling pipe is necessary… what about a radiator?





TPT Monaco



WestBond, Anaham (CA, US)

Wedge-wedge bonding machines – informal quote already received

Also in Bari there is some thinking going on, please follow next talk, from M.T. Camerlingo!

ePIC Bari

Feasibility study!

Summary

- The SVT-Italia collaboration is not very big, but growing
- Progressing in the mandatory tests/activities
- No showstoppers manifest from ’’propedeutic’’ activities
- Under study an extension of our commitment which, at a really moderate financial effort, help the project make a leap in completeness and effectiveness…
- …for the ambition to deliver one of the key detectors for ePIC, “no vertex, no party” ☺
  - would be flabbergasted if stopped by a (financial) detail


That's all Folks!