

ALICE Status



ALICE

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Consiglio di Laboratorio, 02/07/2018



Executive Summary

- Status of the ALICE ITS upgrade stave production
- Physics analysis status
- Manpower
- Conclusions



A Large Ion Collider Experiment

Outer Layers HICs

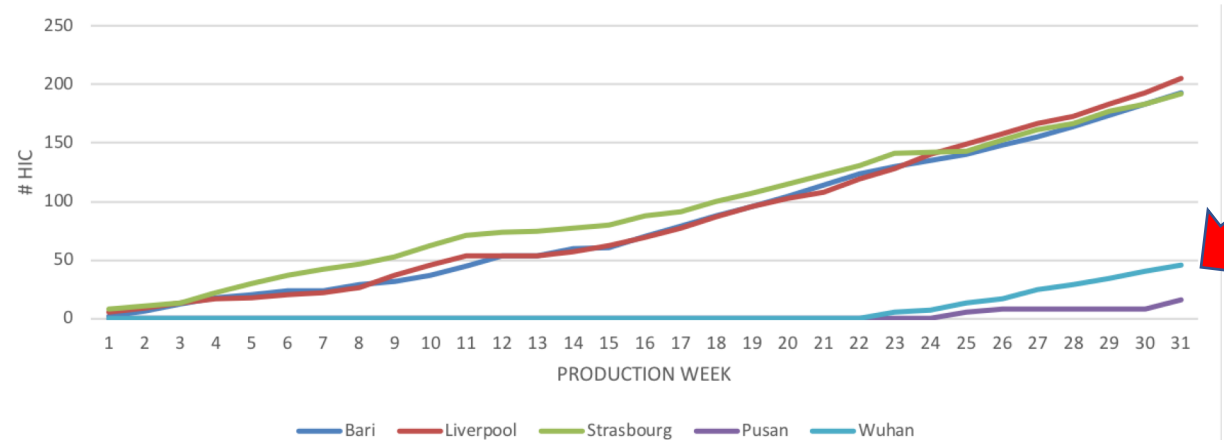
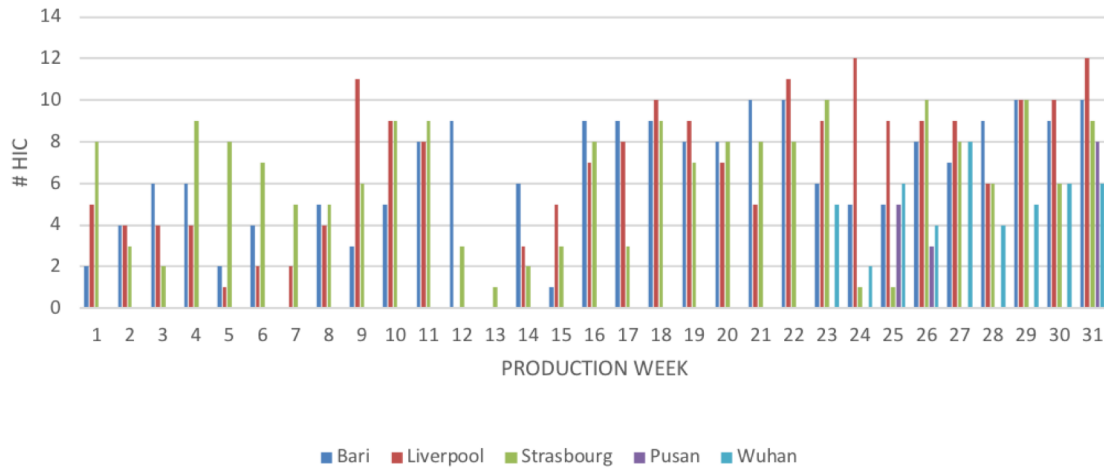
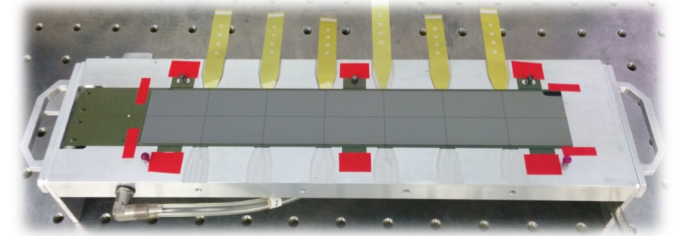
OB HIC Production in numbers

- Nr of OB HIC to be produced: 2115 - 1692 (assuming 80% yield)
- 5 production sites: Bari, Liverpool, Pusan, Strasbourg, Wuhan
- Production rate per site: 2 HICs / day (5 working dd / week)

HICS BUILT SO FAR: ~640 HICS

End production Feb 2019

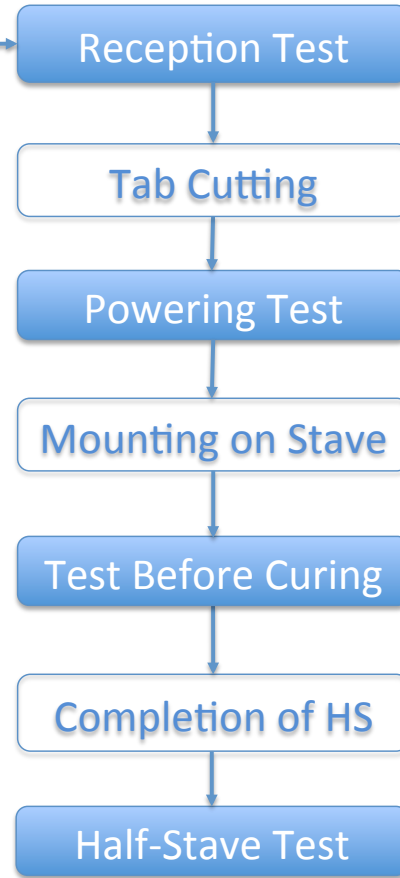
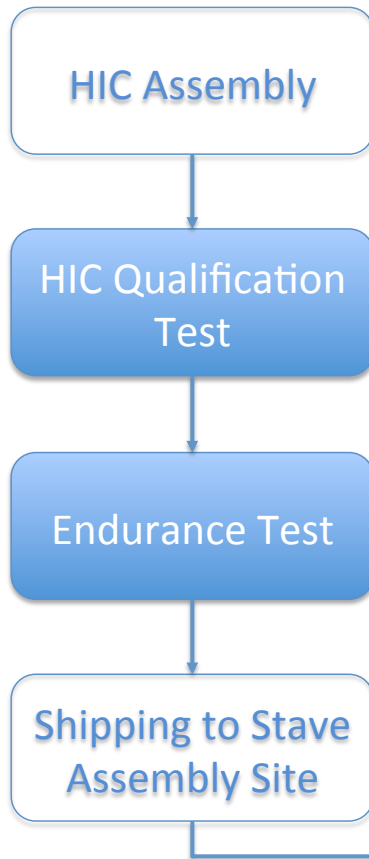
Series Production has started and is progressing well in Bari, Liverpool and Strasbourg. **After pre-series, production has started in Wuhan and Pusan**



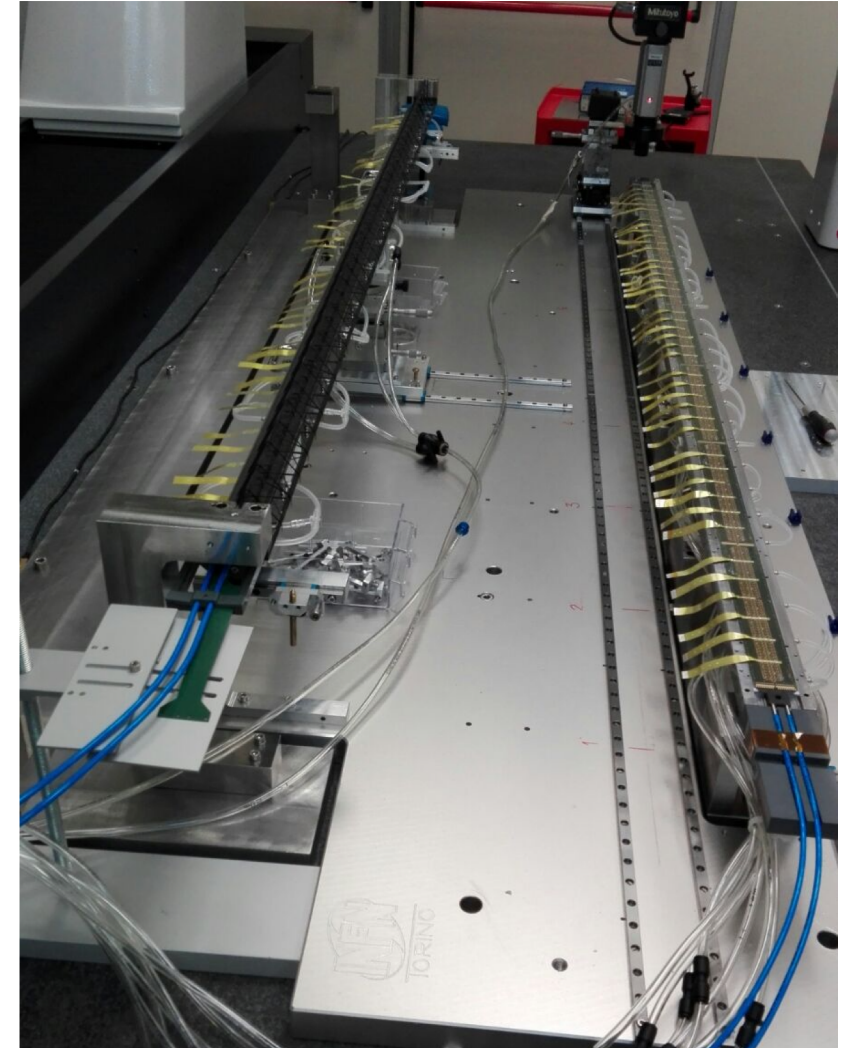


Outer Layers HICs

HIC Production Site



Stave Assembly Site

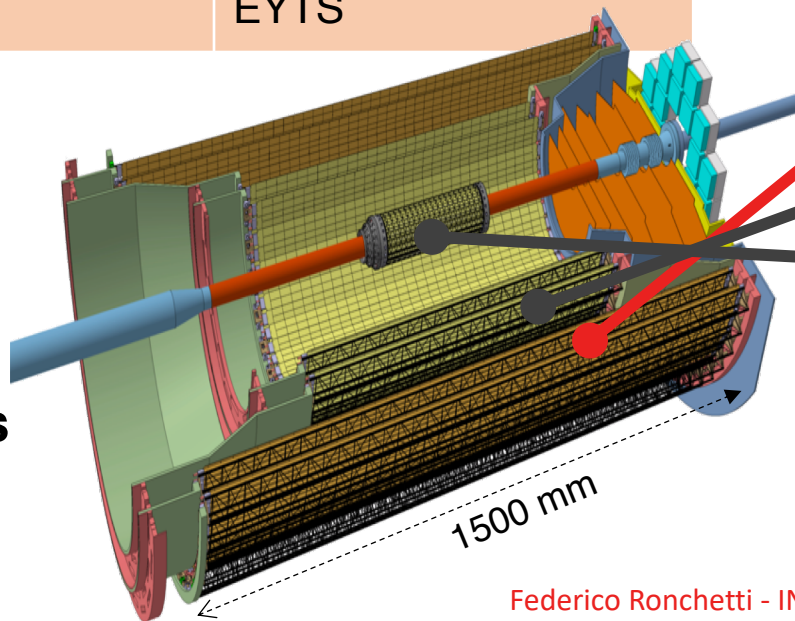




A Large Ion Collider Experiment

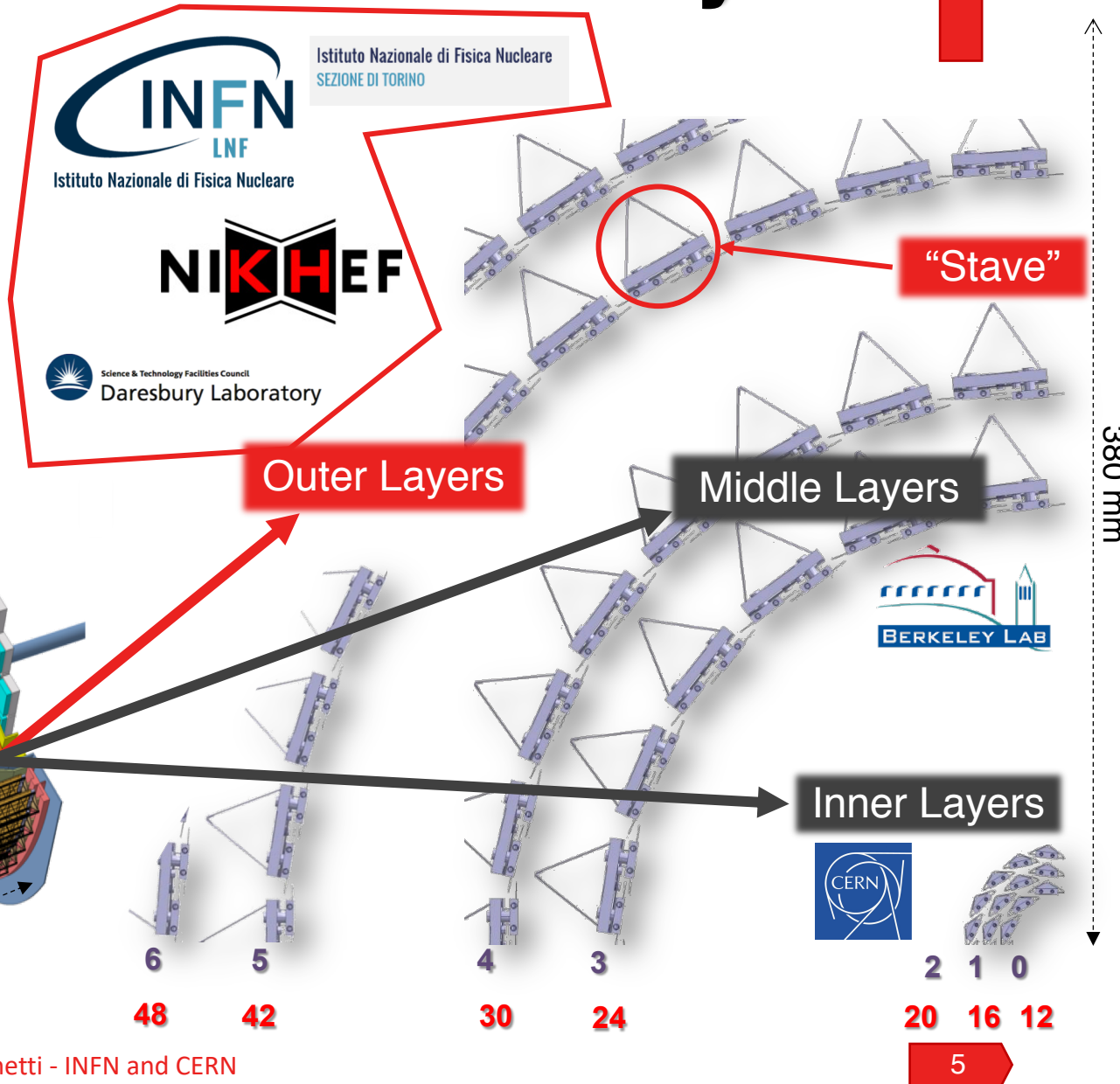
ITS Outer Layers

ITS	Before LS2	After LS2
Technology	Hybrid	MAPS: 180 nm CMOS
Rate	~ 1 kHz	100 kHz
Thickness	~1.14% X_0	0.3% X_0 (IB), 1% X_0 (OB)
Pixel size	425(xy) μ m x 50 μ m(z)	30 μ m(xy) x 15 μ m(z)
Si coverage	39 – 430 mm	22 – 400 mm
Layers	6 (only 2 of pixels)	7
Maintenance	LS	EYTS



**12,500
Megapixels!**

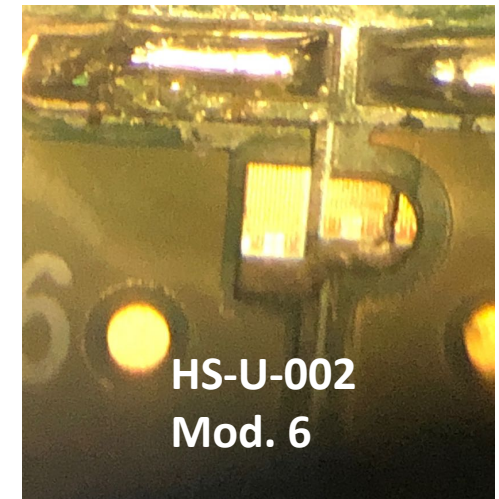
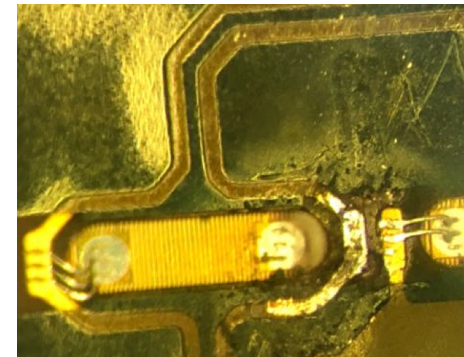
**192 staves + spares
Area: ~ 10 m²**





Half Stave Production

Year	Type	N working chips	Wire bond removed due to short
2017	F-OL-Mech-U-001	Dummy	0
2017	F-OL-Hyb-L-001	14+Dummy	0
2018	F-OL-HS-U-001	74/98 ^(*)	0
2018	F-OL-HS-L-001	84/98 ^(**)	13-14@M3
2018	F-OL-HS-U-002	90/98	14@M3
2018	F-OL-HS-L-002	98/98	0
2018	F-OL-HS-U-003	98/98	0
2018	F-OL-HS-L-003	98/98	0
2018	F-OL-HS-U-004	Ongoing	



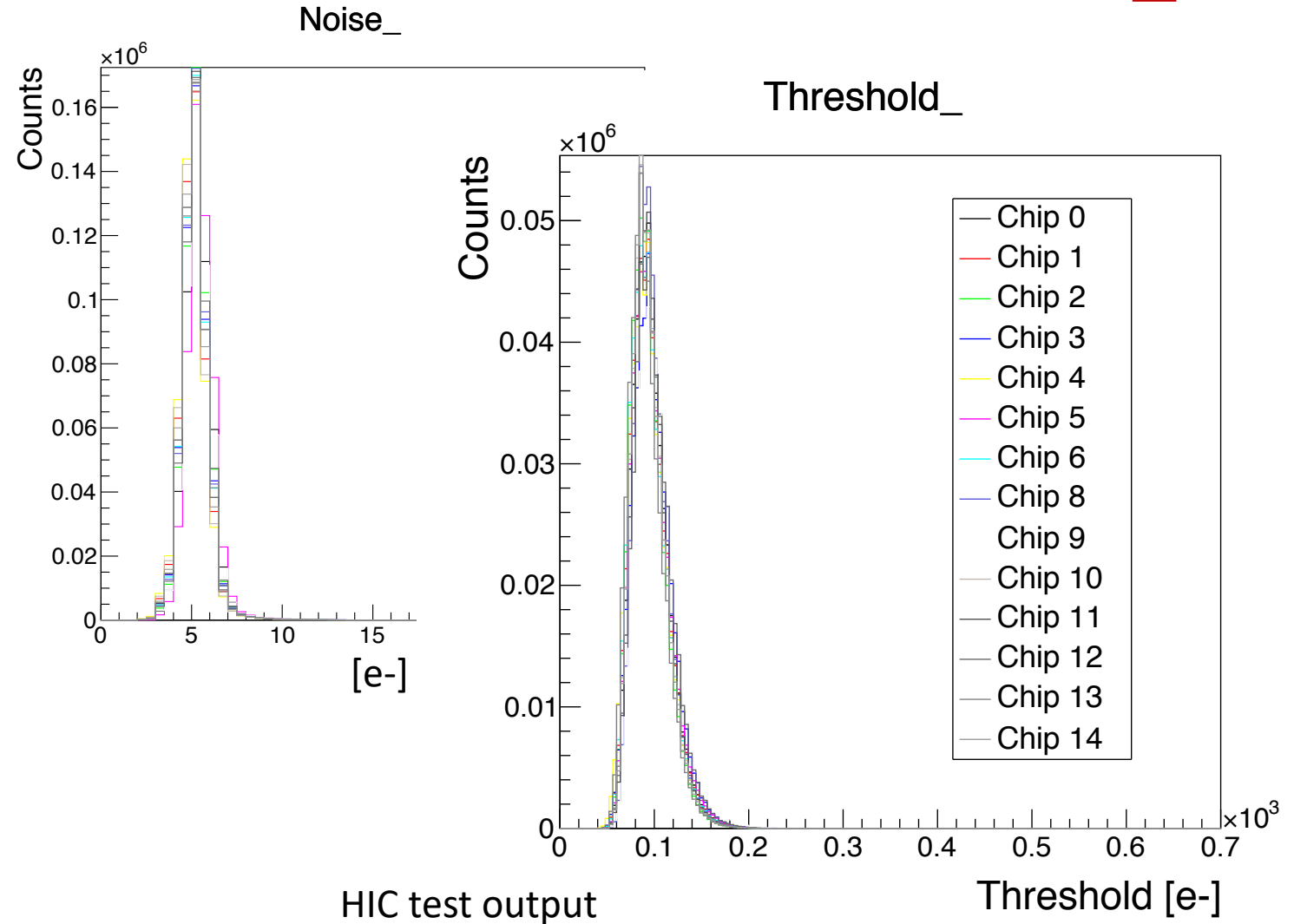
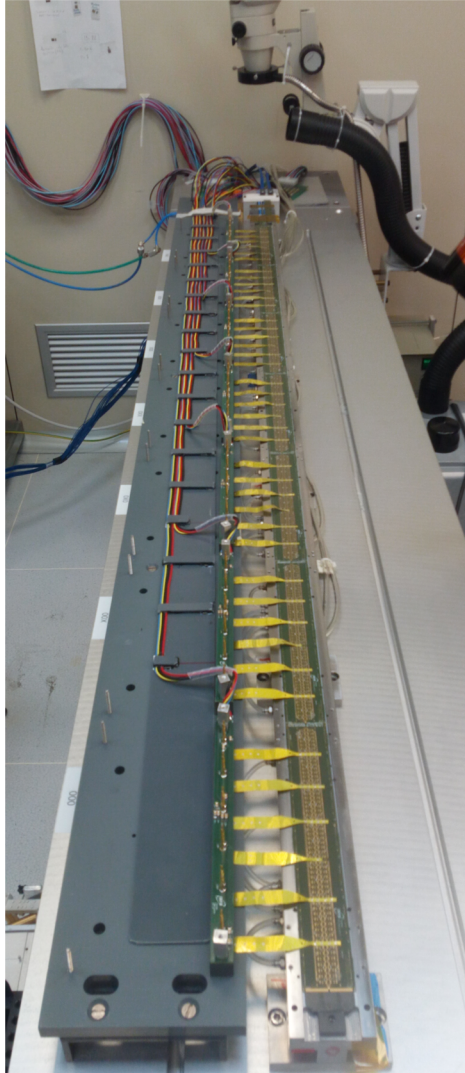
* Modules hit by falling object (incident with thermal camera)

** Modules hit by erratic movement of CMM head (general problem, fixed)



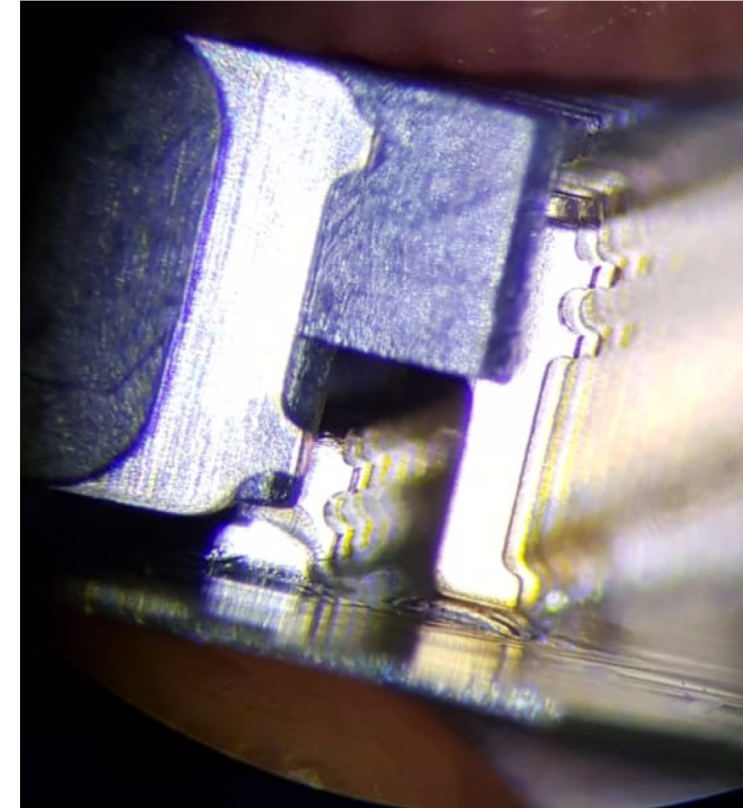
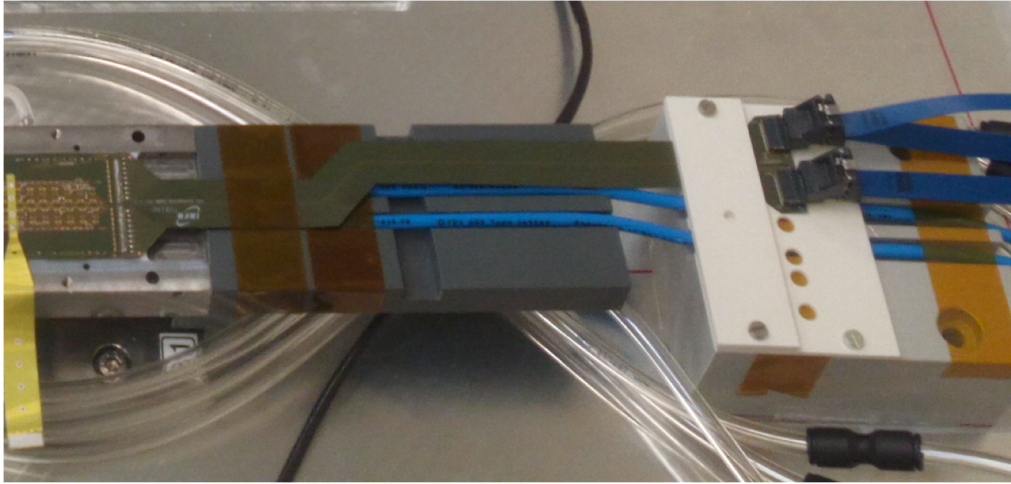
Half Stave Production

- Base modules (HIC=2x7 ALPIDE) are tested at reception
- Half Staves (made of 7 HICs) are tested after soldering using a service power bus
- Staves are tested once the production power bus is soldered (slide 10)





LNf Developments



We found could soldering in the HS FPC extension connectors

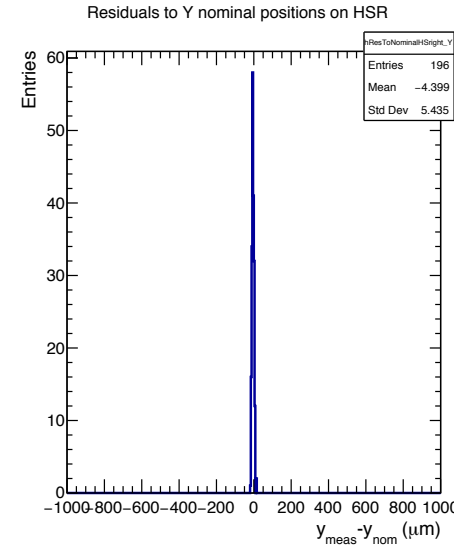
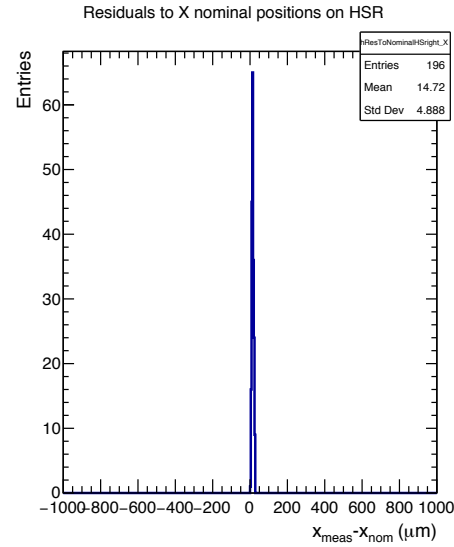
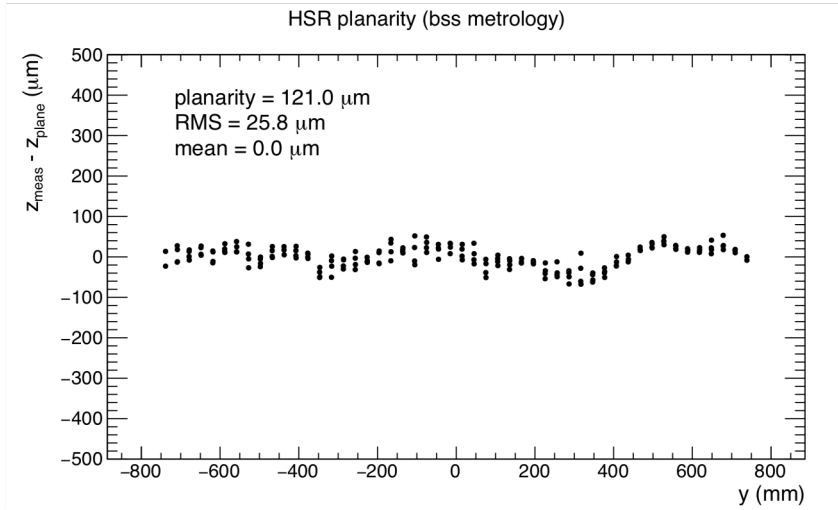
- We managed to replace an already glued and soldered extension
- Problem see afterwards also in other sites: new batch of FPC extensions being produced

We found that the HS stave test setup could not give the -3 V for Reverse Bias

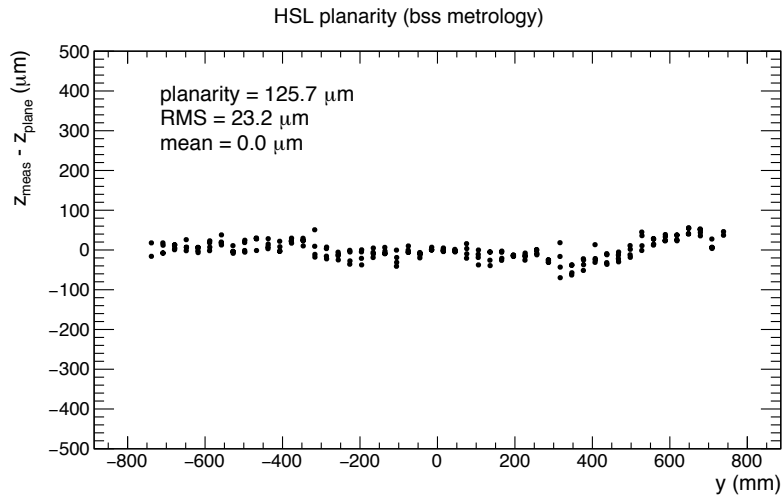
- The problem was in the PSU channel for the back bias was causing trips.
- A delay in switching on the back bias was added on these channels on the power board, to avoids these trips



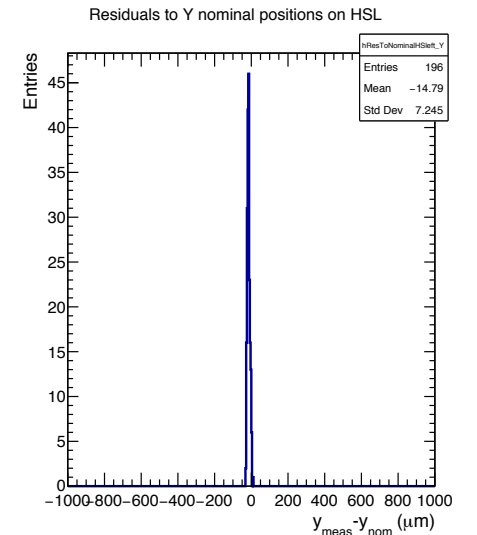
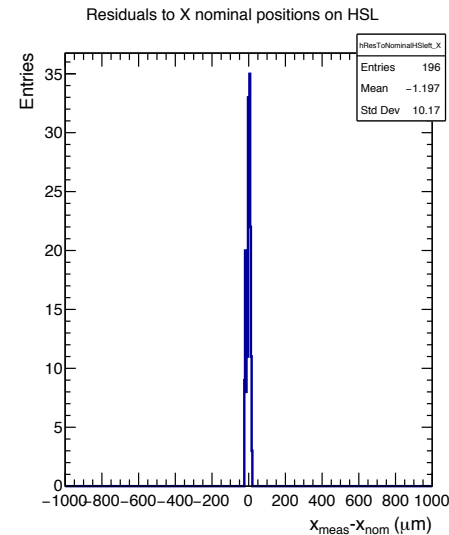
HS Metrology Examples



<10 μm / 1.5 m

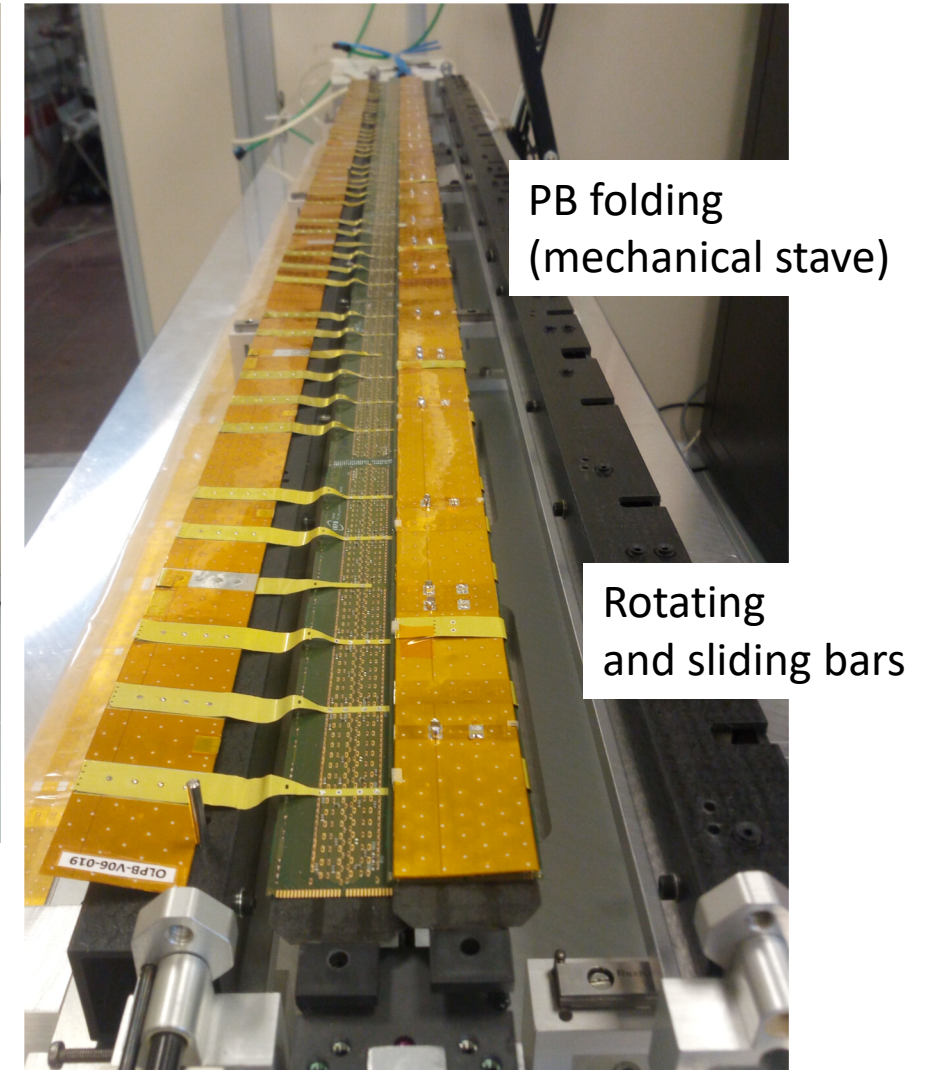
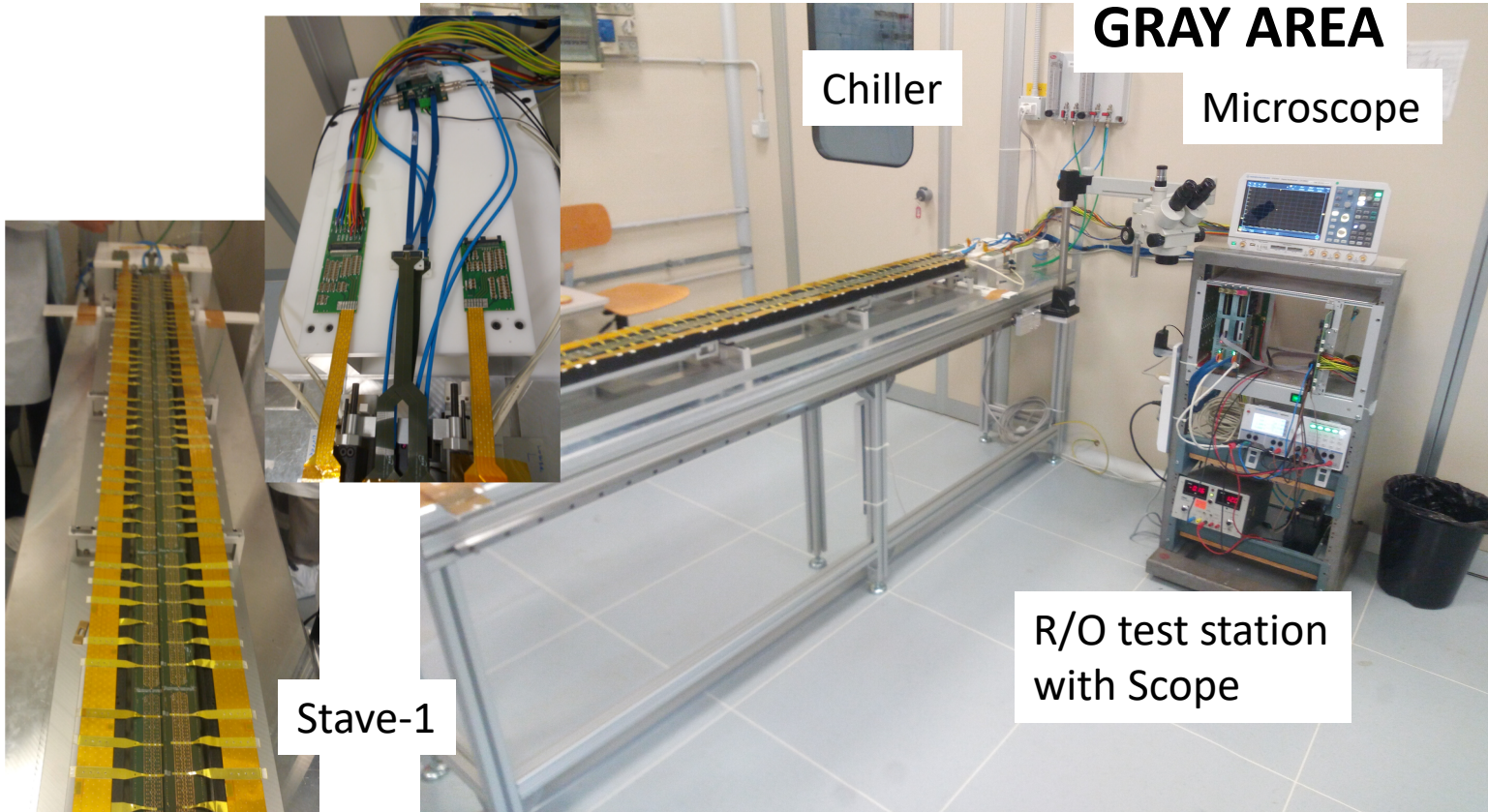


<130 μm / 1.5 m





Power Bus Folding



Soldering of Power Bus, Bias Bus, Filter Boards and cross cables:

- With contribution from the LNF Electronic Service



A Large Ion Collider Experiment

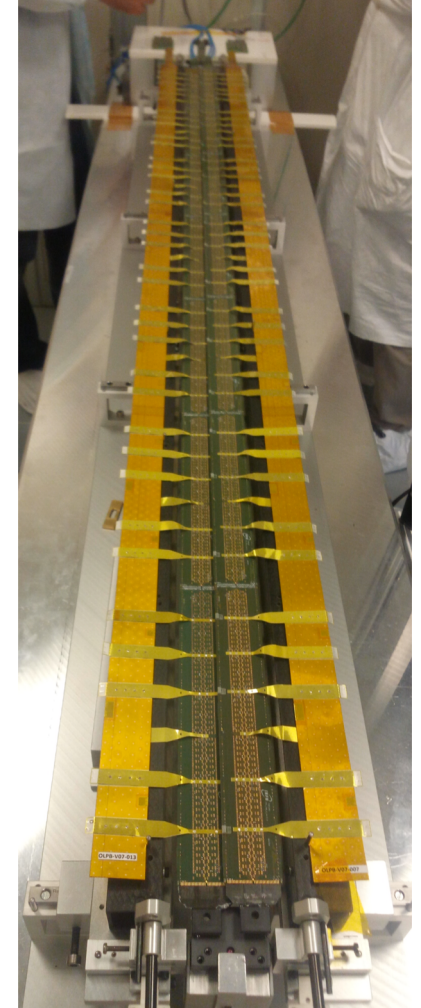
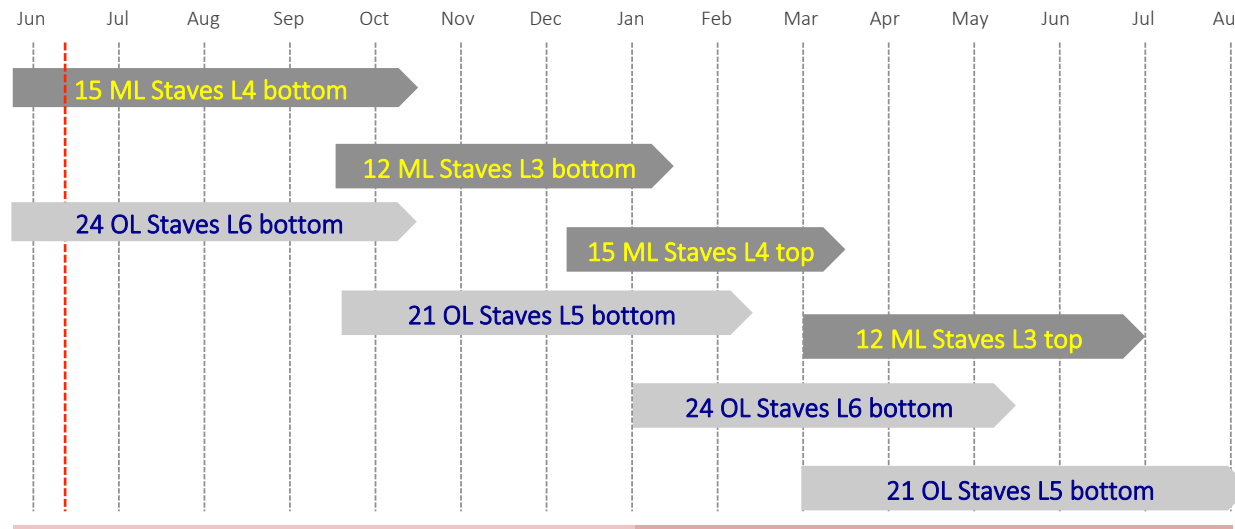
Production Schedule

5 construction sites: Torino, Frascati, Daresbury and Nikhef (OL), Berkeley (for ML)

cumulative number of staves per site

Site	May	June	July (plans)
Torino	4	6	9
Frascati	1	3	5
Daresbury	1	3	5
Nikhef	1	3	5
Berkeley (ML)	1	3	7

- LNF shifts OK
- ASTRA Infrastructure used until august 2019





Infrastructure Developments

- Main ASTRA compressor replacement
- Improved vacuum pumping (redundancy and ventilation)
- Nitrogen generator (ex-Finuda)
- N line for HIC storage cabinet
- N lines in White and Grey areas for cleaning/blowing
- ODH detectors
- Chilled water loop in White and Grey Area
- Secondary TV screen for CMM operations
- Improved vestibule space for ALICE and CMS clean room
- Thermal camera system

+ all the "standard" equipment for stave production...!

L. Passamonti
D. Pierluigi
E. Paoletti
A. Russo

Support from DT
S. Cantarella
M. Monteduro
Supervision: E. Dane'



A Large Ion Collider Experiment

LNF and RM1 ITS Team

Researchers / Technologists: 10.3 FTE



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D. PIERLUIGI
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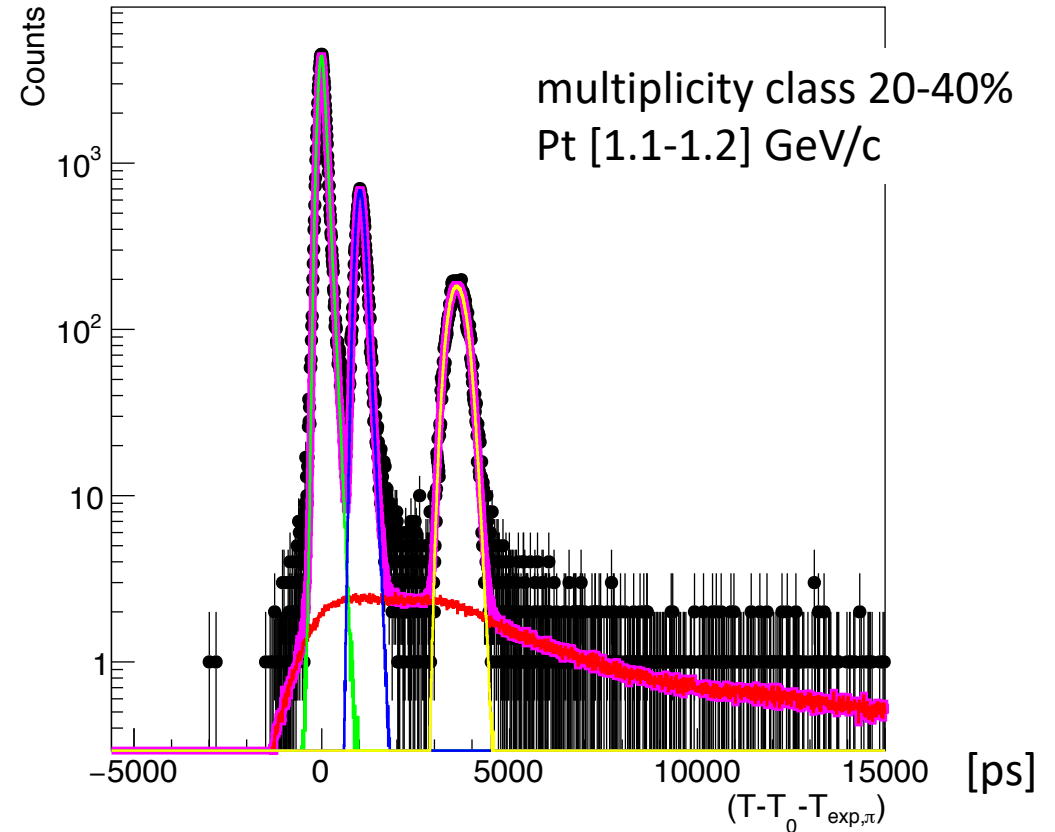


$\pi/K/p$ production in pPb 8 TeV

Study particle composition and dynamics as a function of multiplicity and c.m.s. energy

- Analysis performed pPb data collected in 2016. Will extend the analyses on pp and $PbPb$
- The p_T range with ITS-TPC-TOF 0.1-5.0 GeV. Up to 20 GeV using TPC relativistic rise.

Subdetector	p_T range	People
ITS: Inner Tracking System → low- p_T tracking and PID through dE/dx	0.1-0.6	Pavel Larionov
TPC: Time-Projection Chamber (TPC) → tracking and intermediate- p_T PID through dE/dx	0.3-0.8	Silvia Pisano
TOF: Time-Of-Flight (TOF) → intermediate- p_T PID	0.5-5.0	Marco Toppi

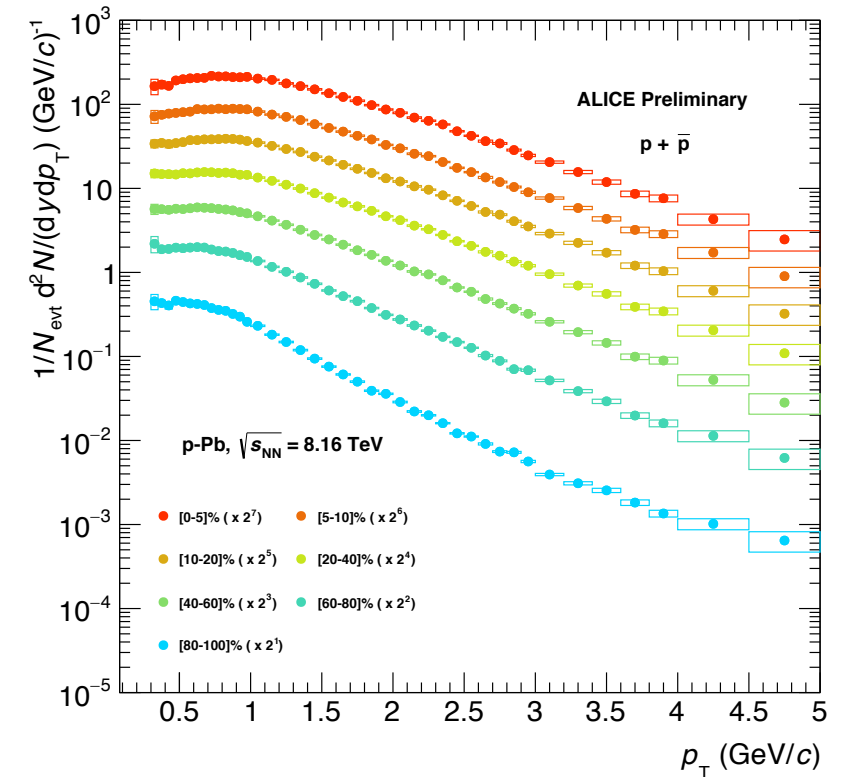
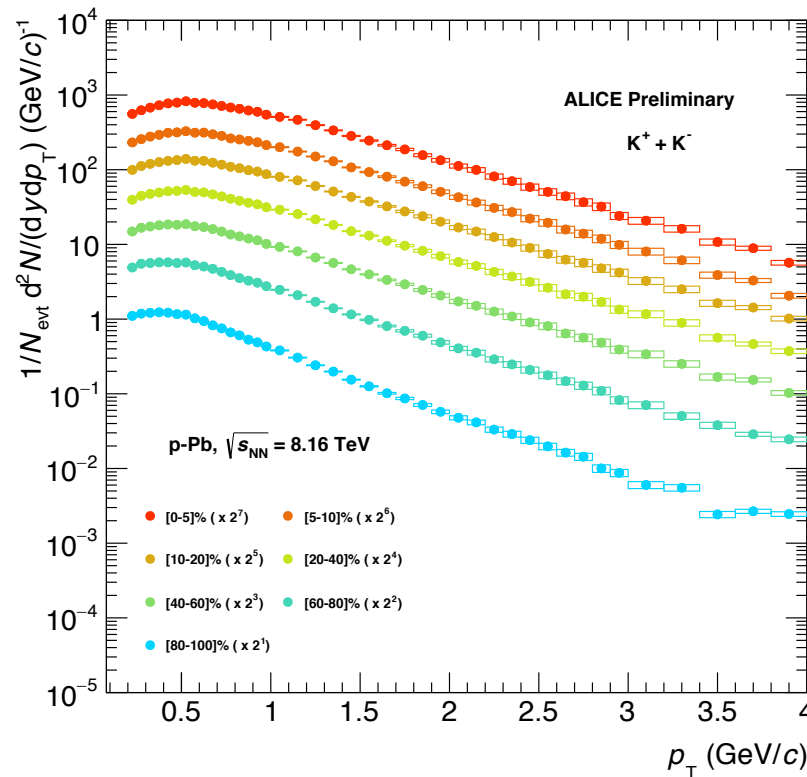
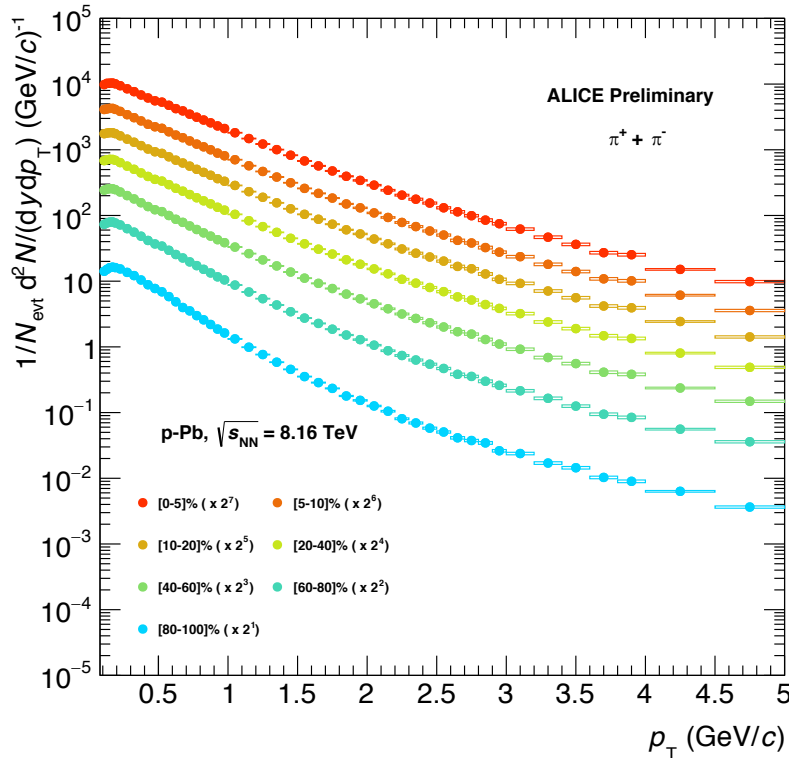




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- The PT range with ITS-TPC-TOF 1-5 GeV. Up to 20 GeV using TPC relativistic rise.





Conclusions

- LNF stave production in line with global project constraints and estimations
- LNF has given valuable feedback to the ITS collaboration
- End of OL global production: August 2019
- LNF shifts schedule OK

BACKUP