

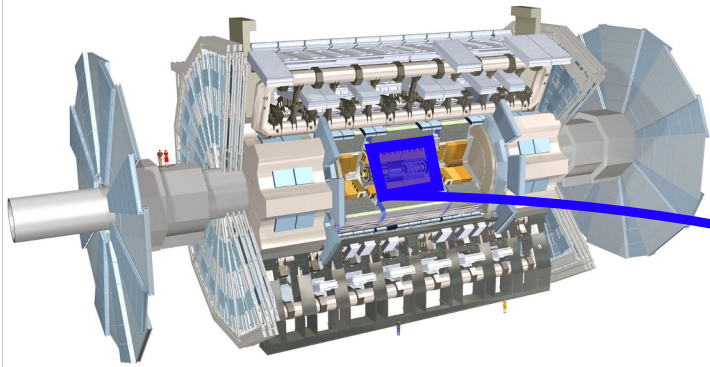
ATLAS ITk Strip Module Status in China

Xin Shi

On behalf of China ATLAS ITk Team

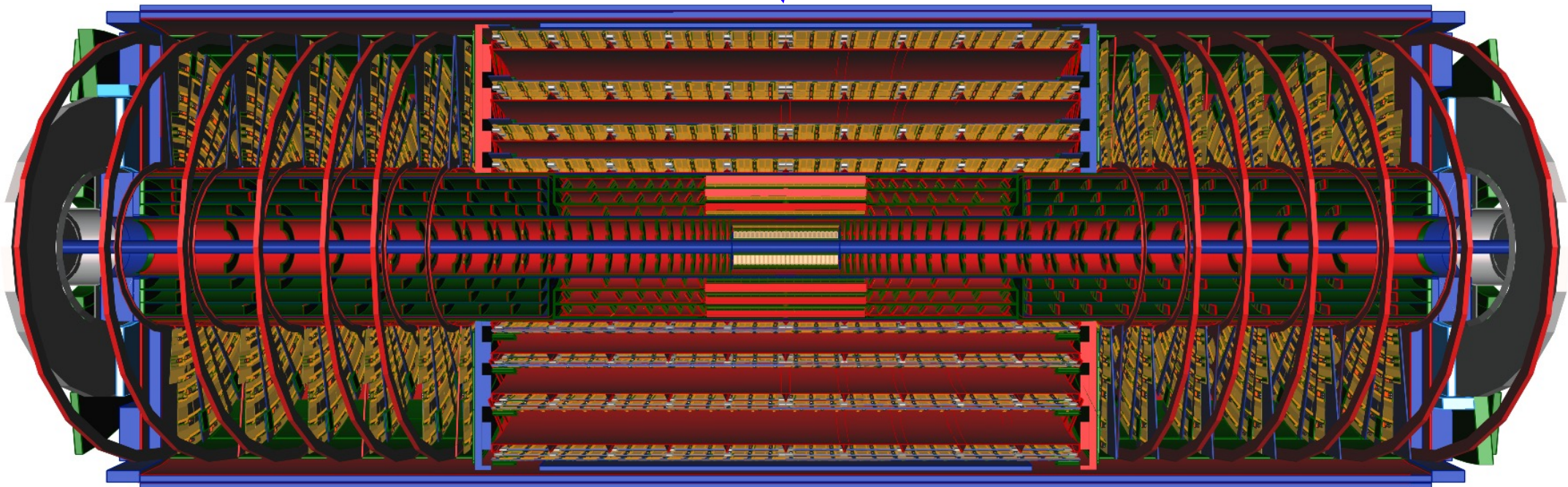


ATLAS Inner Tracker (ITk) Upgrade



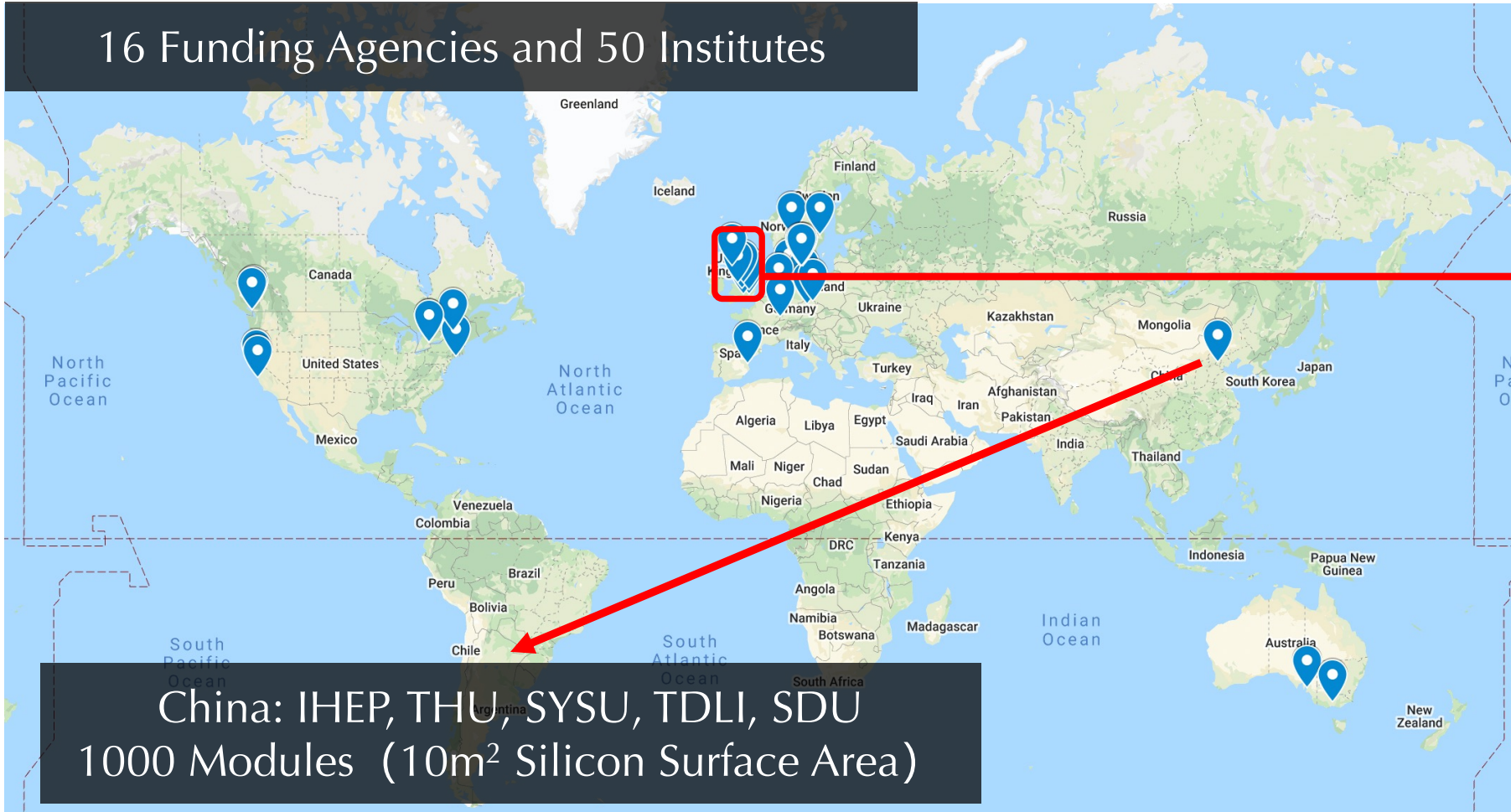
Inner Tracking Detector (ITk)

- All silicon with at least 9 layers up to $|\eta| = 4$
- Less material, finer segmentation

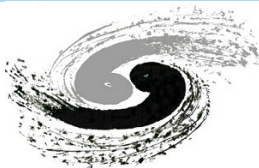


ATLAS ITk Strip Project World Wide

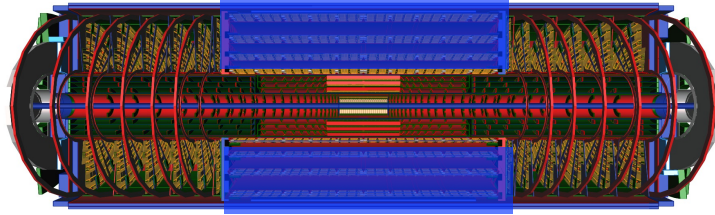
16 Funding Agencies and 50 Institutes



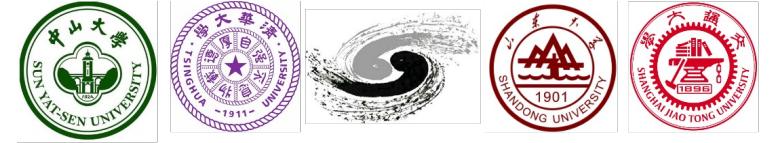
UK/China Cluster
50% Barrel Strip Detector



China ITk Strip Detector Contribution



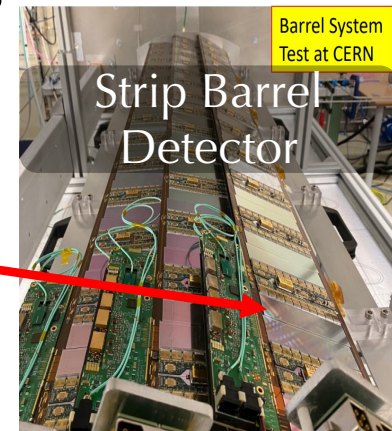
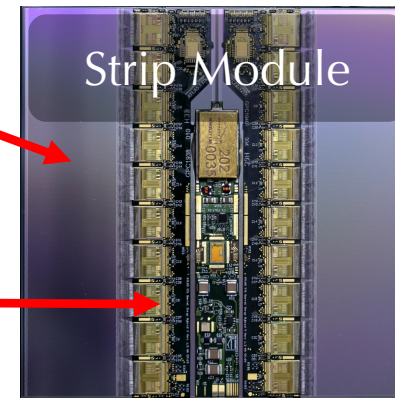
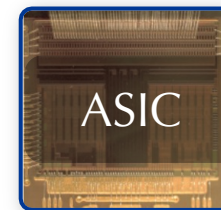
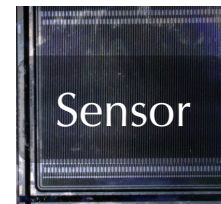
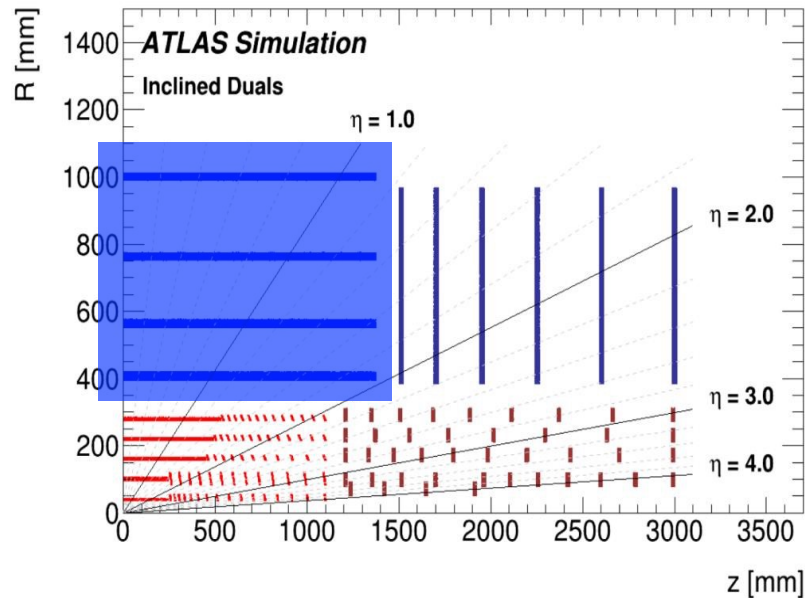
CORE Deliverables



- China [IHEP/THU/SYSU/SJTU/SDU] deliver 10% strip barrel modules (> 1000 , $\sim 10\text{m}^2$ of sensor surface)
- 500@IHEP / 500@RAL (UK)

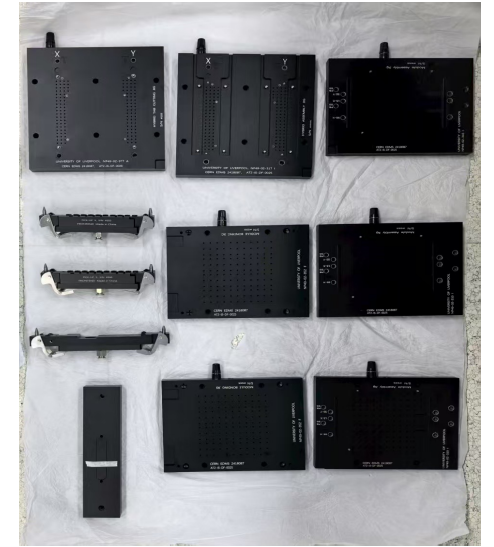
Contents

- Radiation hard sensor and readout ASIC study
- High performance strip detector module production
- Complex silicon detector system integration



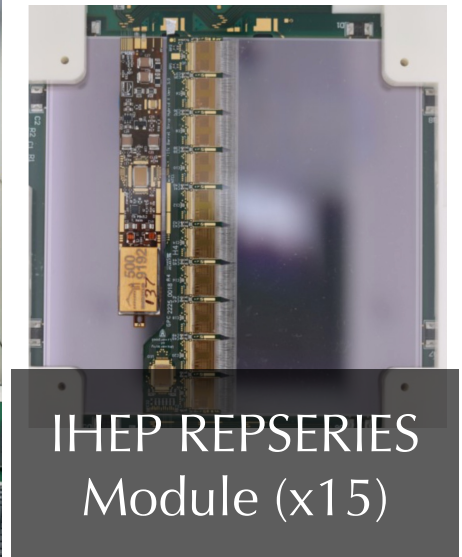
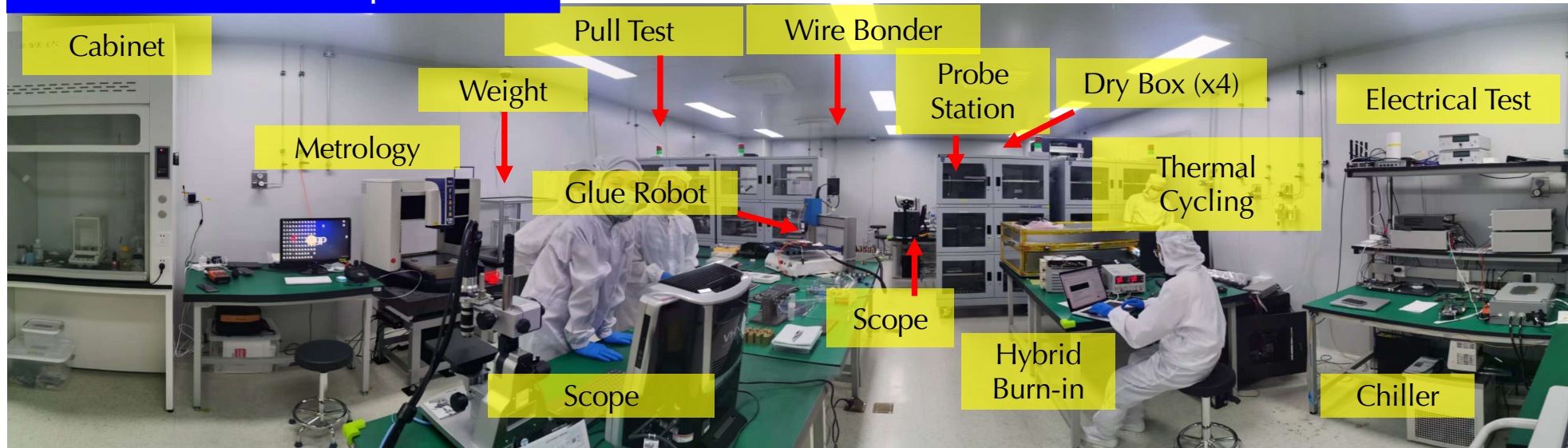
IHEP Site Module Production Status

- Passed PRESERIES stage for Module production
 - Produced 15 PRESERIES modules
 - Contributed to 150 PRESERIES modules at RAL
- Manufactured 11 production tooling in China



New tools made in China

IHEP Site for ITk Strip Module



IHEP REP SERIES
Module (x15)

Standard Operating Procedure (SOP)

Zhan Li,
Yebo Chen,
Shudong Wang,
Mengke Cai



- Developed at IHEP for local production
 - Accessible to PC and Tablets with internal network
 - All SQ 29 steps have been implemented in SOP

<http://atlasitk.ihep.ac.cn>

Standard Operating Procedure

IHEP ATLAS-ITk

Standard Operating Procedure

⚡ Powered by [itkdb](#) ⚡

2025-10-23 @ 21:05:50

Temperature

22.2°C

↑ 0.0°C

Humidity

52.0 %

↑ 0.1 %

Connect to ITk
Production Database

Bulletin Board

2025-10-23 @ 21:05:50

Module Hybrid DUMMY Inventory

Module Overview

Local Name	GLUED	MEASURED	BONDED	E-TESTED	THERMAL-CYCLE_DONE	FINISHED_MODULE	SHIPPED
IHEP-Module-iLS-PRESERIES-4	PASS	PASS	PASS	PASS	PASS	PASS	PASS
IHEP-Module-iLS-PRESERIES-5	FAIL	PASS	PASS				
IHEP-Module-iLS-PRESERIES-6	PASS	PASS	PASS				
IHEP-Module-iLS-PRESERIES-7	FAIL	PASS	PASS				
IHEP-Module-iLS-PRESERIES-8	FAIL	PASS	PASS				
IHEP-Module-iLS-PRESERIES-9	PASS	PASS	PASS				

Production Monitoring

Select component type

Module

Select component:

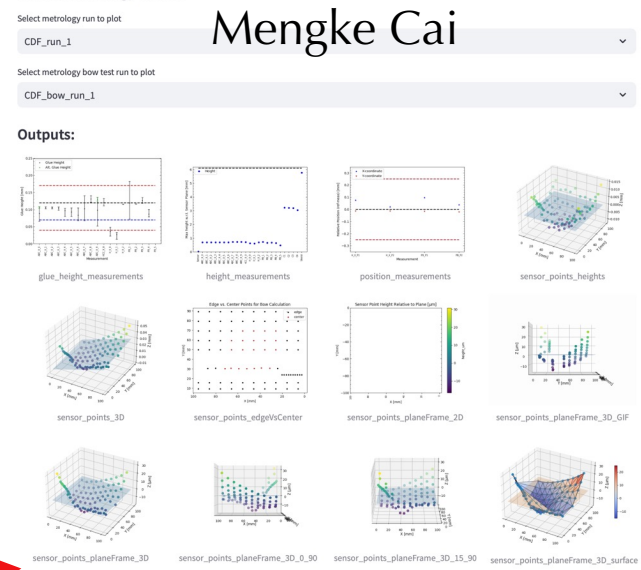
IHEP-Module-iLS-PRESERIES-10

Component current local stage: SHIPPED

Component basic info:

	IHEP-Module-iLS-PRESERIES-10
ATLAS SN	20USBML1235504

Module Metrology Results



Module Wire Bonding Visual Inspection Results

Select the run number

1

Run Number	Test Date	Passed	Problems
1	2025-06-16T12:23:00.000+08:00	☒	☐

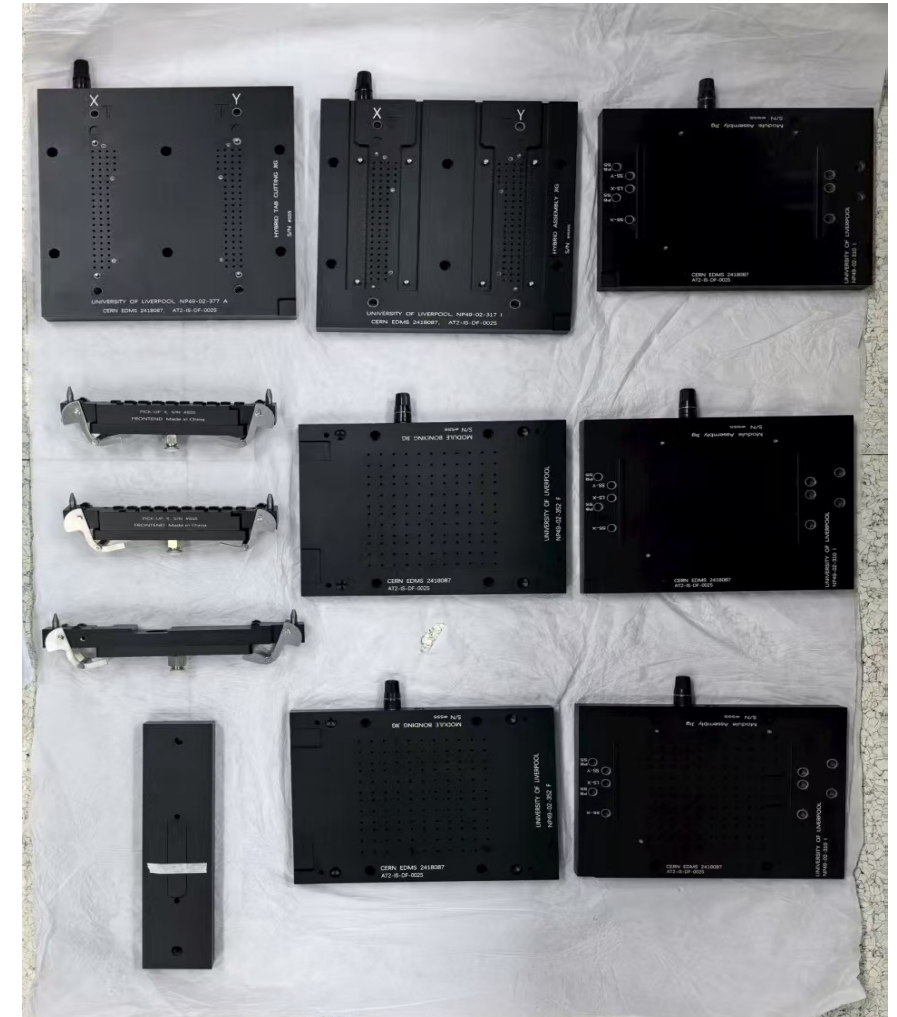
Tooling Production and Metrology

Lei Guo, Yang Liu

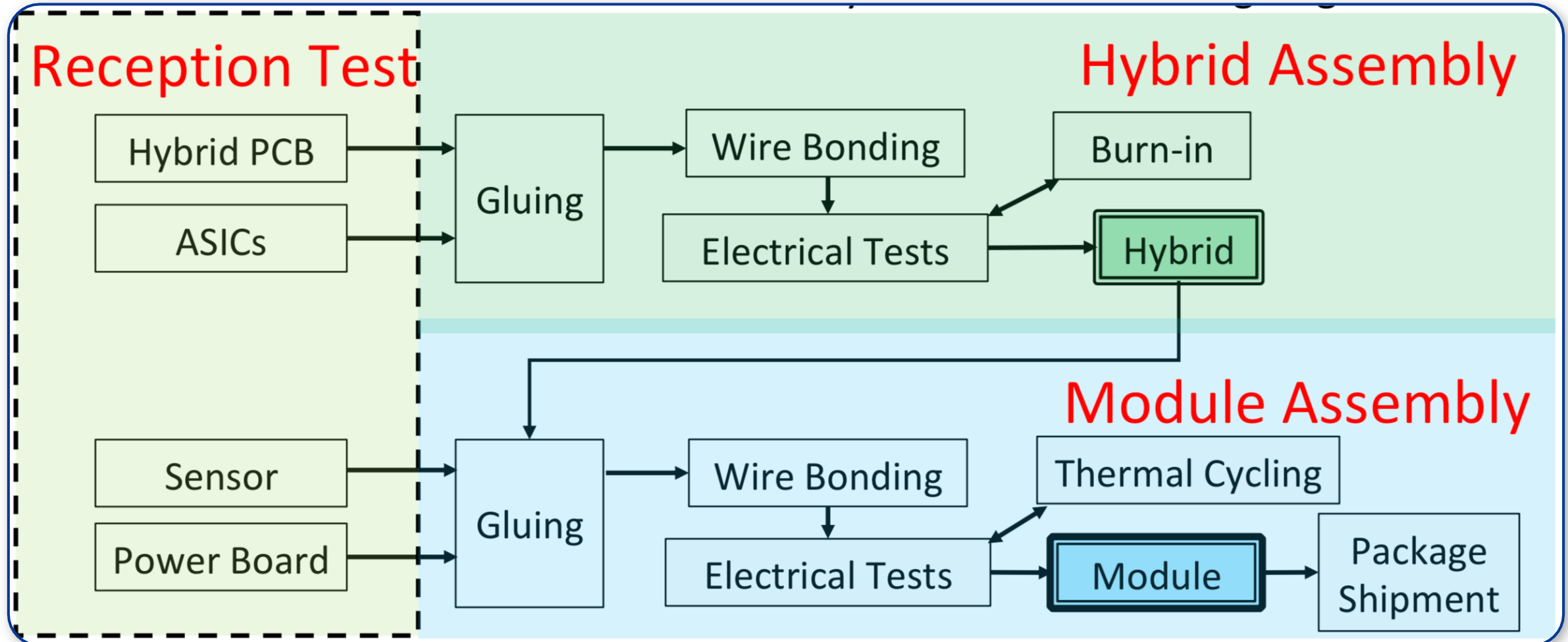


- 11 pieces of tools produced in China
- All passed the metrology qualification

[A] Tools	123 Amount	[A] Part Number	[A] Comment
Hyb Asm Jig	1.0	NP49-02-316	1 for asm, 1 for metro
X Hyb Pku Tool	2.0	NP49-02-327	1 for hyb asm, 1 for mod asm
Hybrid Tab cut Jig	1.0	NP49-02-376	
Sensor Jig	3.0	NP49-02-309	2 for mod asm, 1 for metro
PB Pku Tool	1.0	AU-1012-3985	
PB Jig	1.0	AU-1012-5646	
Module Jig (Wire-bond)	2.0	NP49-02-351	



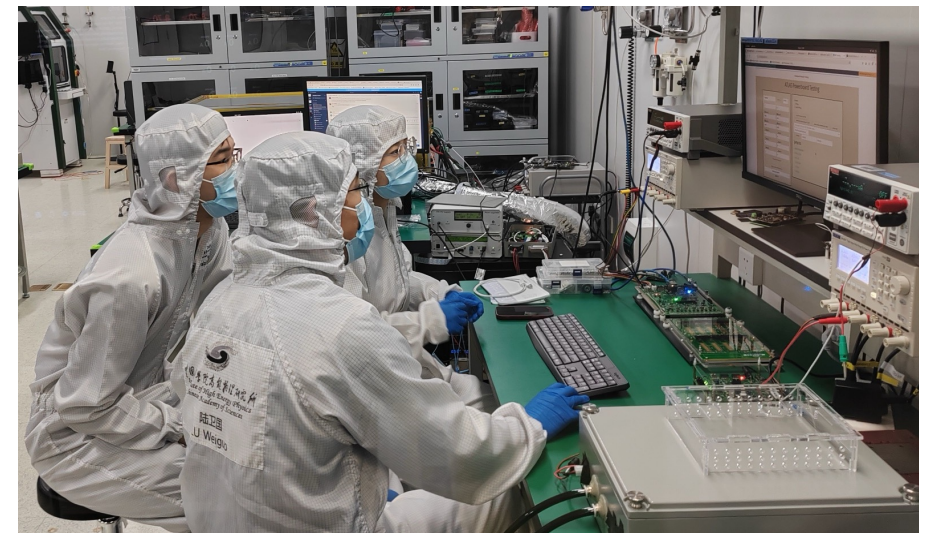
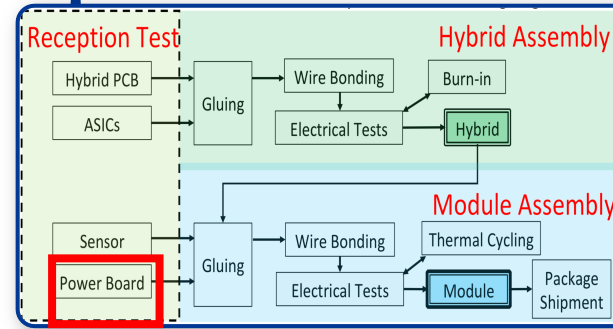
Hybrid and Module Assembly workflow



Powerboard Reception

Basic Functionality Tests

- output voltage
- wirebonded AMAC PADID
- bPOL output with enable low and high
- HV PS current with HVMUX closed / open
- Sensor current with HVMUX closed /open
- AMAC measurement of “sensor” current
- NTC temperatures
- DCDC adjustments

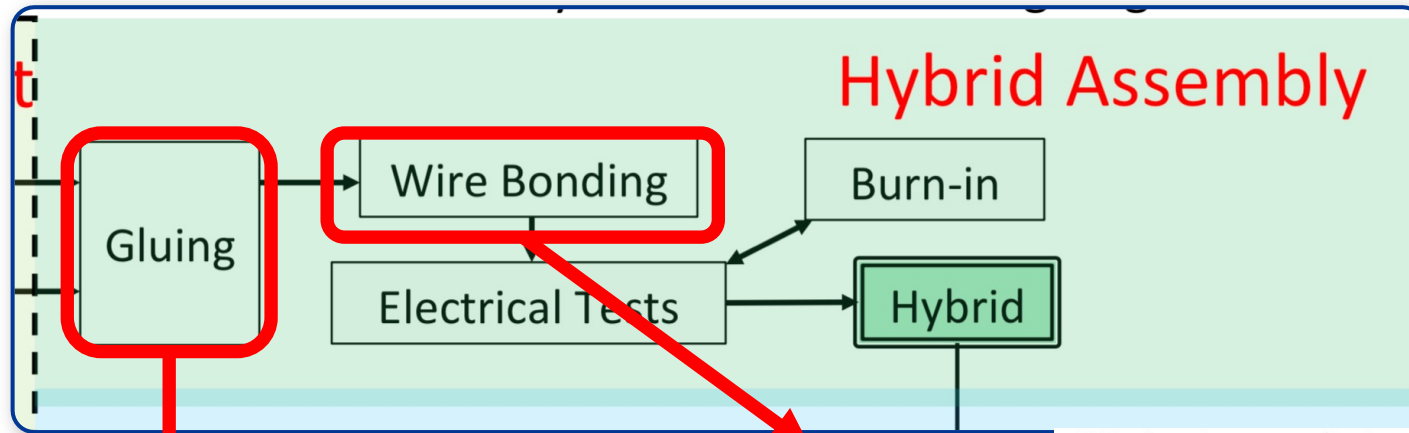


Hybrid Assembly

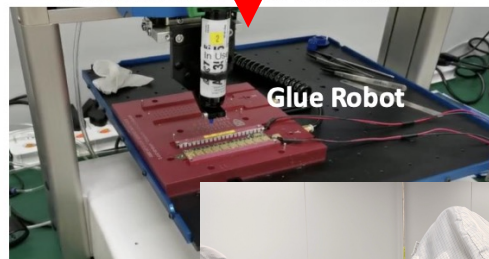
Qi Cai, Yuxuan Zhang
Xiran Mi, Yibao Chen, Xin Chen



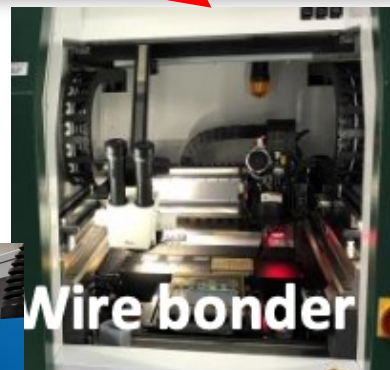
Mengke Cai, Sen Zhao,
Yanpeng Li, Xiyuan Zhang,
Zijun Xu



Calibration of glue amount

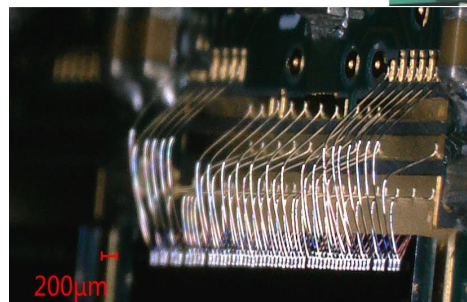
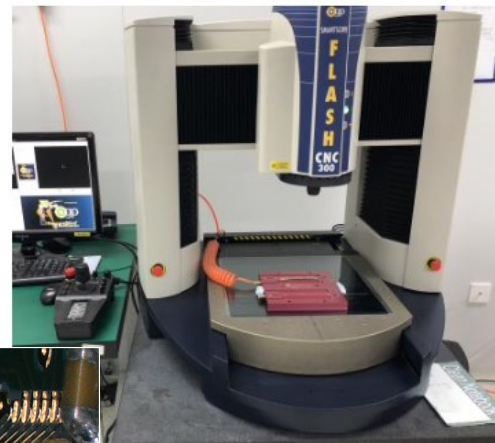


Glue Robot



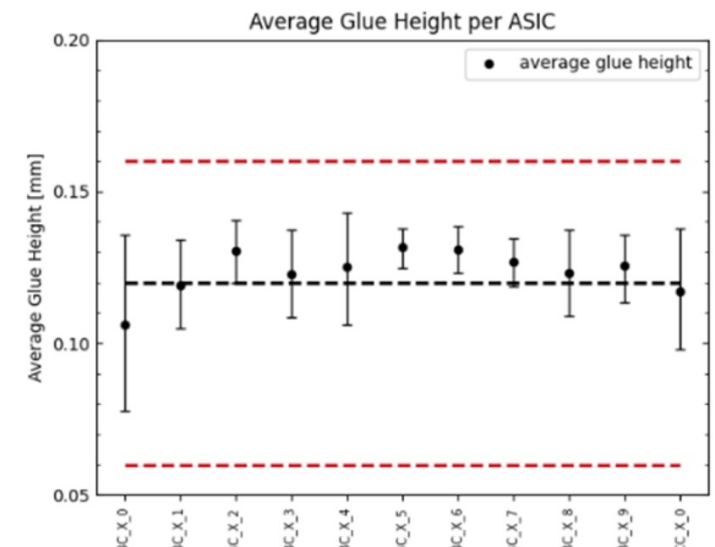
Wire bonder

Metrology of glue thickness



200μm

Glue Height
within specs

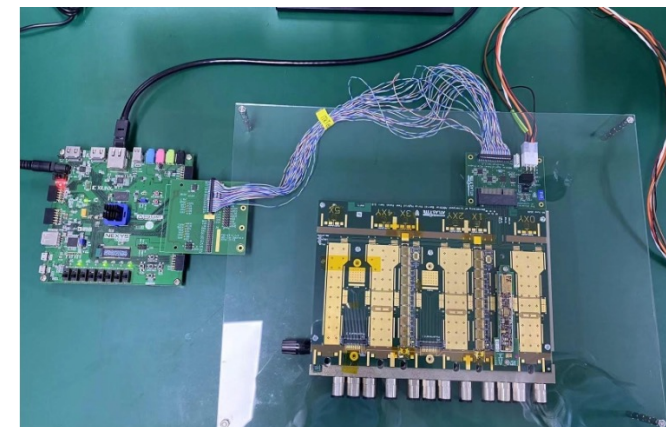
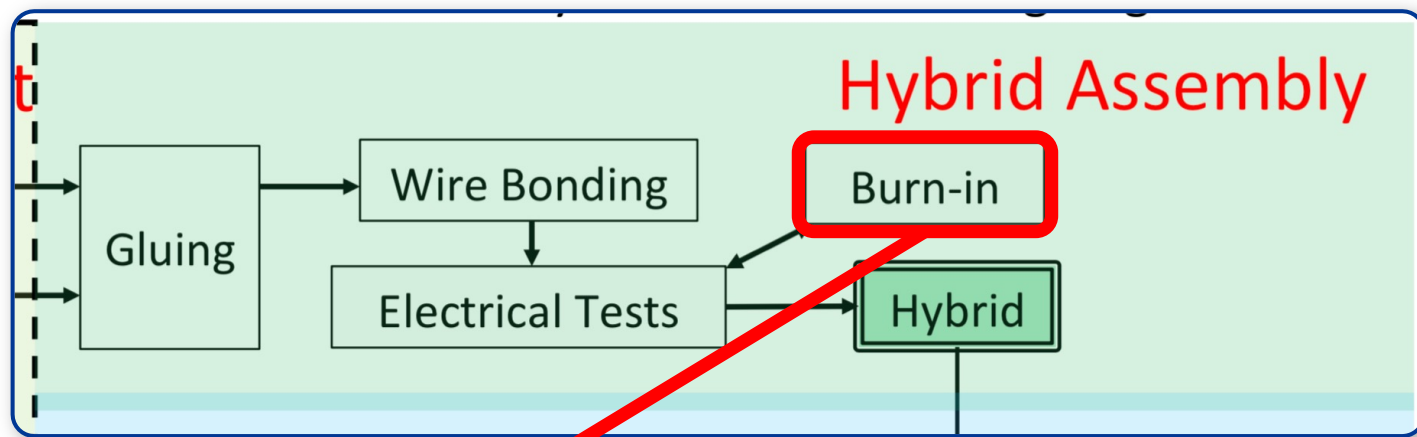


Hybrid Test

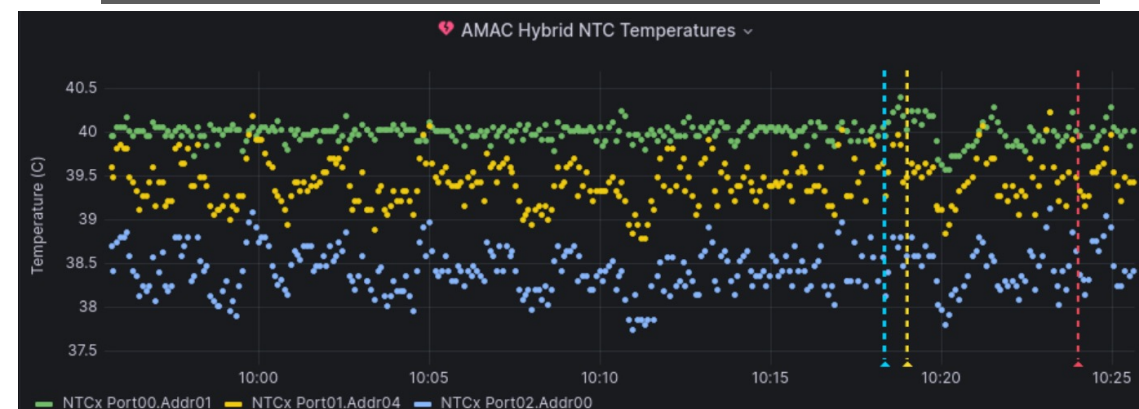
Qi Cai, Yuxuan Zhang
Yibao Chen, Xin Chen



Weiguo Lu

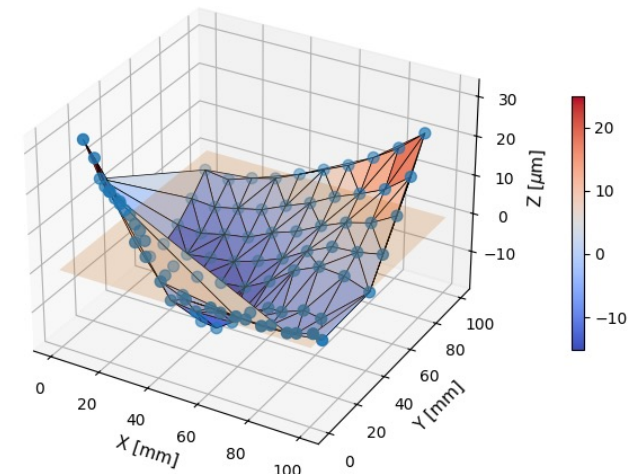
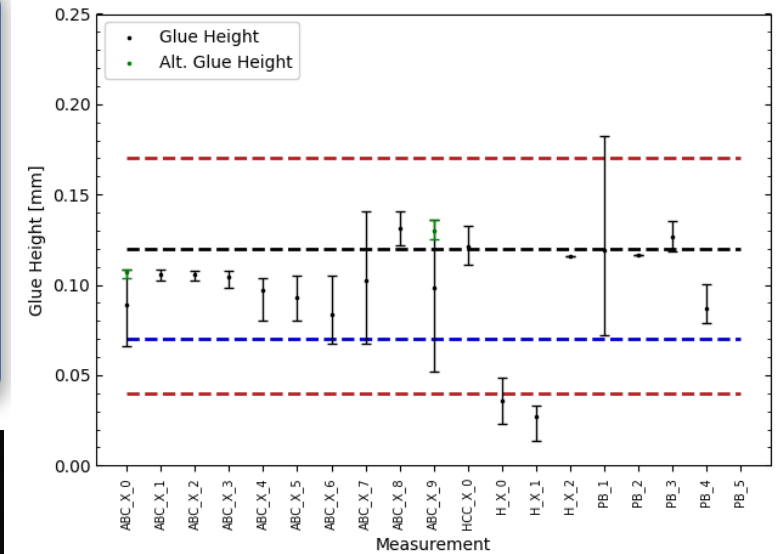
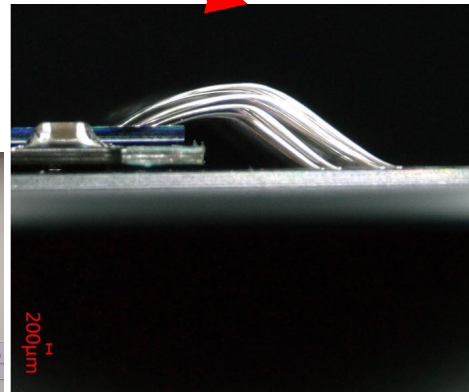
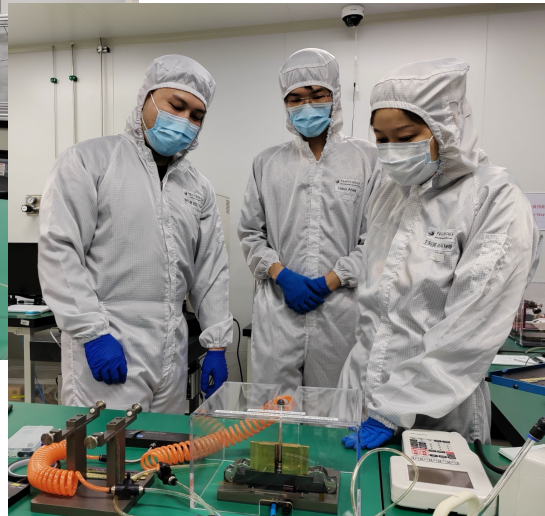
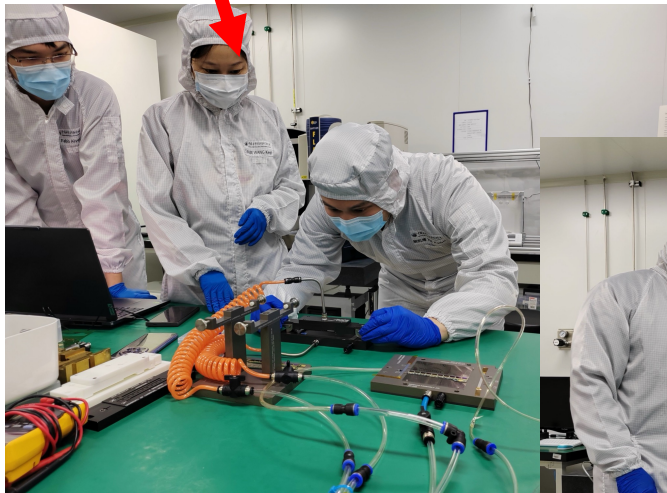
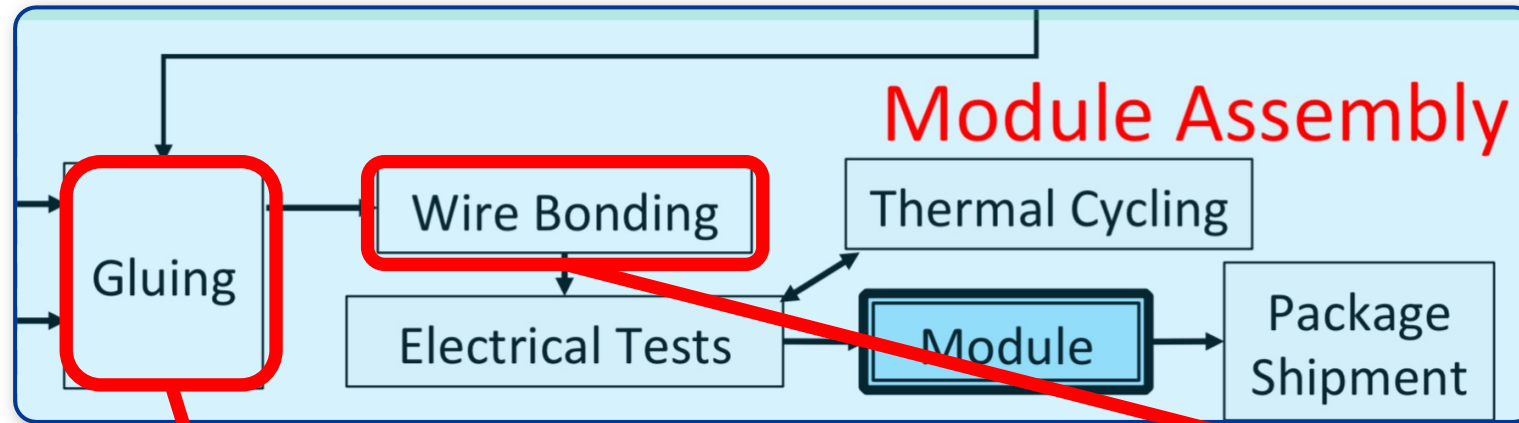


Burn-in Test Temperature under control



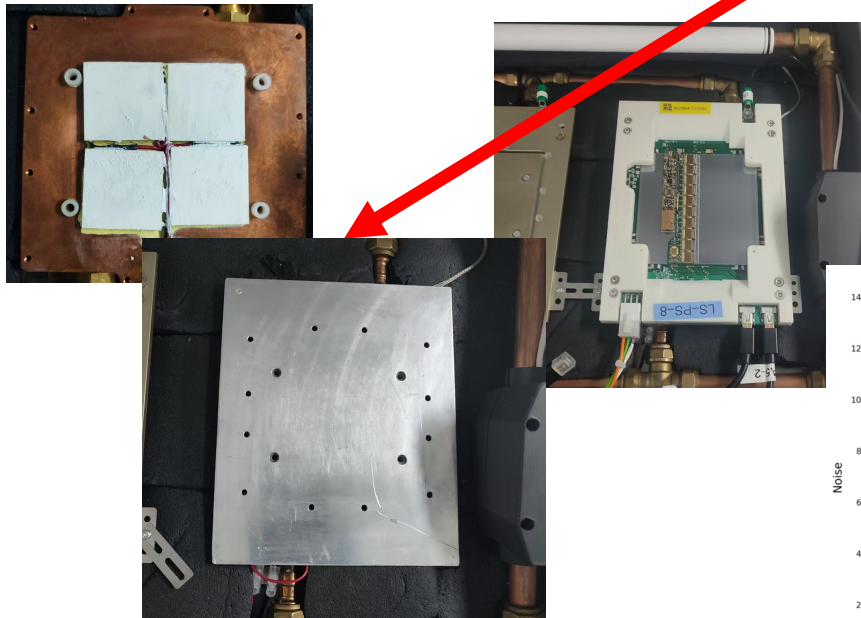
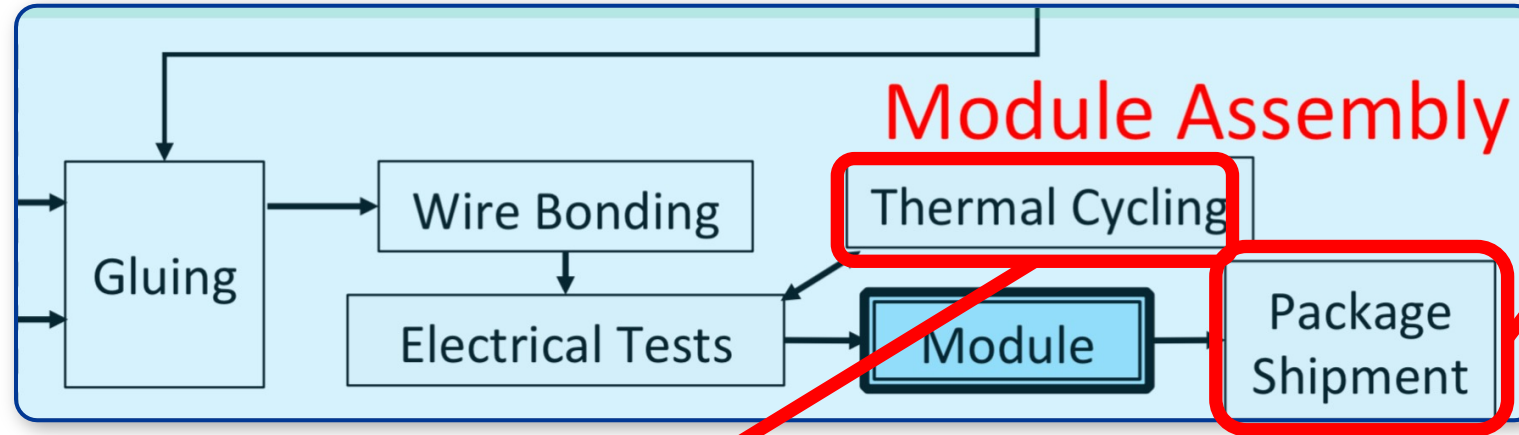
Module Assembly

Mengke Cai, Sen Zhao,
Jiaqi Zhou, Xingchen Li,
Xiyuan Zhang

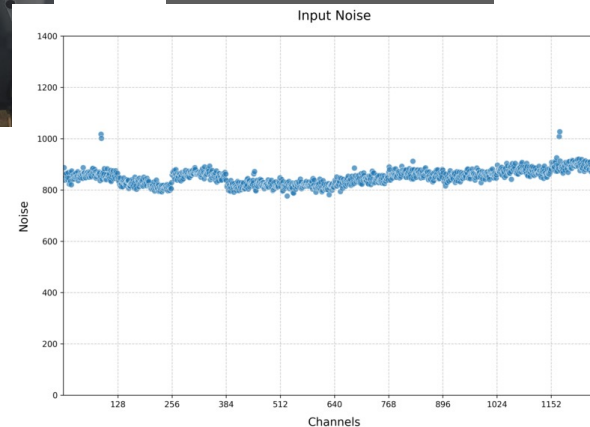


Module Test

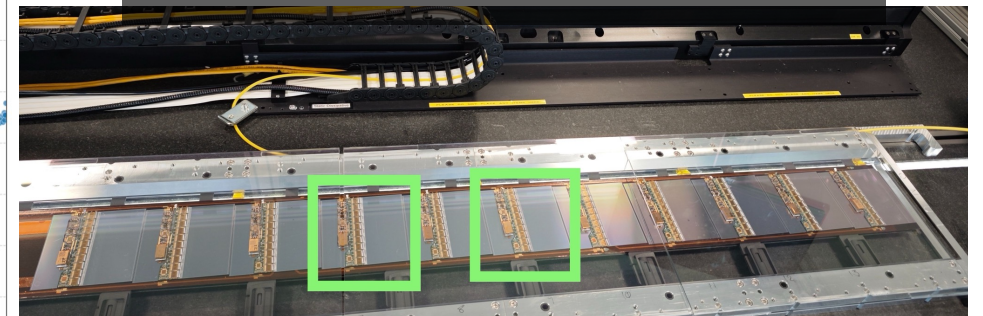
Mengke Cai, Chenxi Fu, Xingchen Li,
Zijun Xu, Weiguo Lu



Input Noise



Installed on Stave at RAL



RAL Status

Shaogang Peng, Yuxuan Zhang

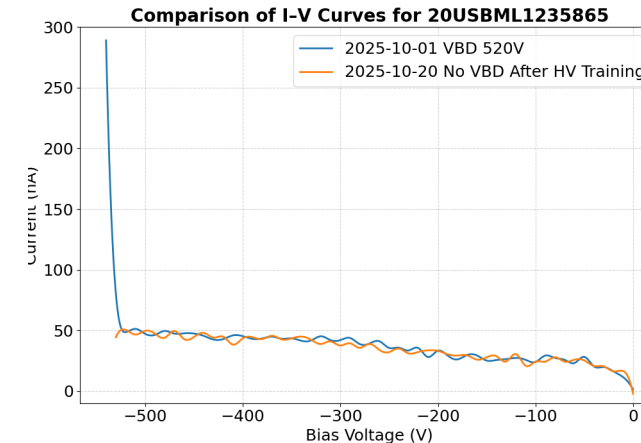
Chengwei Wang



- Two FTEs from China based at RAL
- Participate on module assembly and testing
- Receive modules from production sites, conduct visual inspections and electrical tests for subsequent stave assembly
- Implemented UV light exposure setup for strip module HV breakdown recovery
- Assist in shipping components for module production from CERN or other sites and ensure their delivery to IHEP



2 UV lights



Summary and Outlook

- China is responsible to deliver 10% ITk Strip barrel modules
- IHEP site produced 15 PRESERIES modules and 58 hybrids
- Significant contribution to RAL module production and stave loading
- Ramping up for PRODUCTION

ATLAS ITk Strip Sensor Quality Assurance by Zhan Li

ATLAS ITk Strip Module Test beam by Lin Yang

