

MIT interests and plans

*ePIC SVT DSC kickoff meeting
June 9th 2023*

Gian Michele Innocenti (CERN)

Currently a member of the ALICE CERN team
→ ***starting January 2024, MIT junior faculty***

Relevant expertise of the MIT group

Leading role in the R&D, characterization and commissioning of Silicon Detectors and in the design/commissioning of data acquisition, trigger, and DCS systems

- **PHOBOS**: overall leadership, silicon spectrometer construction, readout electronics, DAQ
- **CMS**:
 - leading role in the commissioning of the silicon pixel and strip detector for heavy-ion runs
 - development of electronics and control software for the L1 trigger system (Stage 1)
 - MTD design and (in the future) construction and commissioning
- **STAR IST**
 - mechanics and cooling at MIT-Bates
- **sPHENIX (MVTX - ITS2 technology)**:
 - mechanical design, cooling, and integration of the MVTX at MIT-Bates
 - module characterization, MVTX DCS (see above)
 - MVTX commissioning and first data (ongoing)
- **ALICE-sPHENIX joint project**:
 - characterization and development of the control/monitoring software (DCS) for sPHENIX MVTX and ITS2



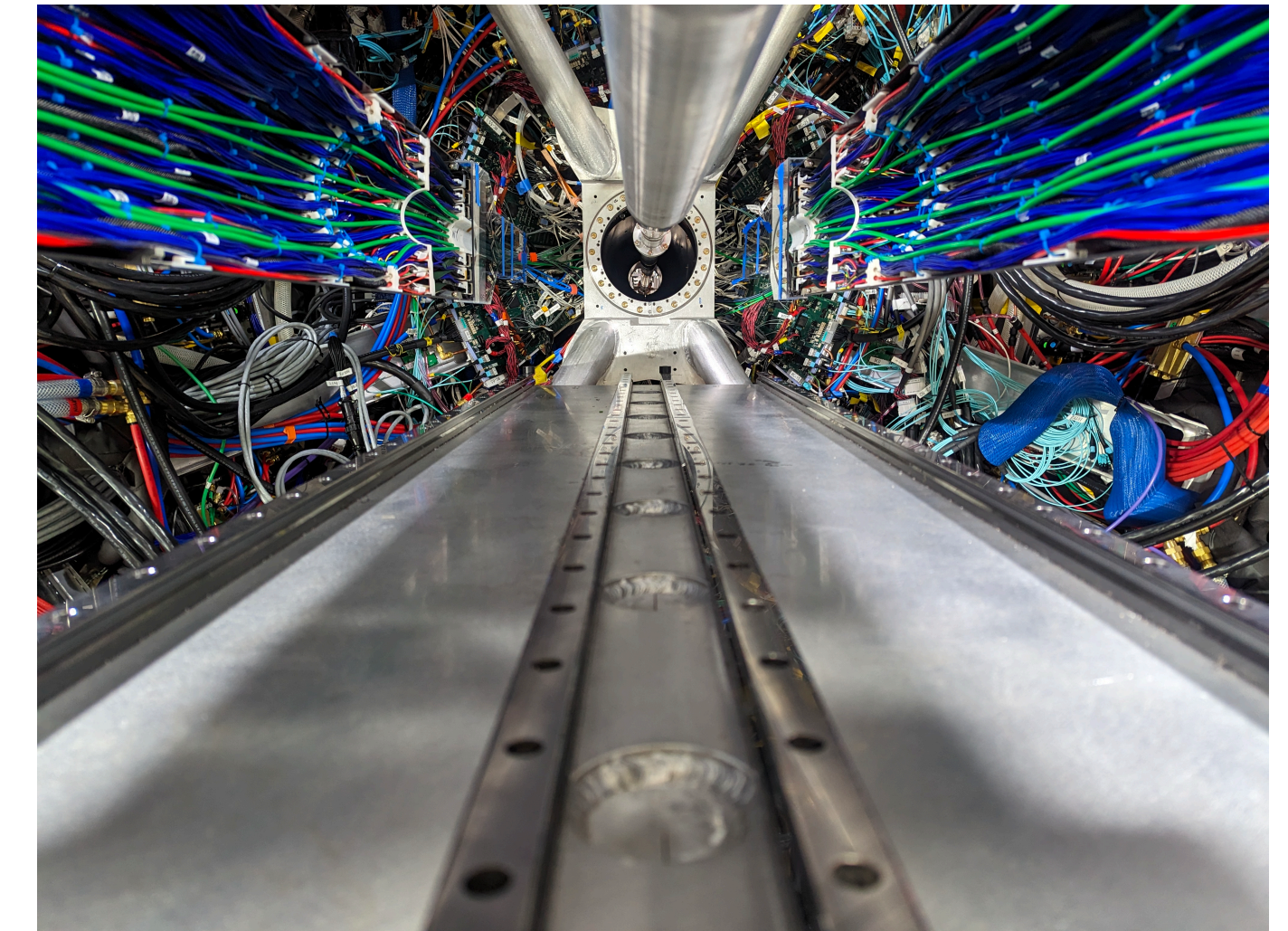
Long-standing record of fruitful collaborations with several institutes and organizations!

→ As a group that is joining a new project, we look forward to new collaborations with institutes of the SVT working group.

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Members of the actual team had previous experience in ALICE in vertexing R&D, commissioning and upgrades

- R&D, characterization, and commissioning of the **Silicon-Pixel Detector (SPD)** of **ALICE** for **Run 1**
- calibration and maintenance of the **Silicon-Drift Detector (SDD)** of **ALICE** in **Run 1**
- performance physics studies for the TDR of the **Inner-Tracking System 2 (ITS2)** for **Run 3**
- physics program, performance, simulations for the heavy-flavor program of ALICE 3 for Run 5 and 6 (**larger-area ITS3 sensors**)

A new synergy between MIT and ITS team for ITS3/SVT R&D

As a member of the ALICE ITS3 team, I proposed the formation of an ALICE ITS3-MIT collaboration for silicon-pixel R&D towards ePIC SVT relying on the “model” of the sPHENIX MVTX-ITS2 collaboration

Motivation and goals:

- having a fully integrated **MIT-ITS3 team based at CERN** to maximize knowledge transfer toward the SVT
- concrete benefit for ITS3 (both workforce and equipment)

Collaboration “model” that I propose:

- shared workforce, lab space, and equipment to boost ITS3 and SVT R&D



As part of this “synergy”, MIT will purchase a new 300 mm wafer-probing station and a climatic chamber

MIT/ITS3 plans for June–December 2023

- **(Current-July 2023) Integrating the miniMOSS (ER1) into the beam-test software:**
 - essential steps toward the miniMOSS beam tests planned for Summer/Fall 2023
 - adding functionalities to the DPTS software
- **(August 2023 -December 2023) Lead the first beam tests with the ER1 chip**
 - contribute to the optimization of the telescope setup
 - validate and test the test-beam software using the new telescope
 - beam tests in different facilities

Workforce:

- **G.M. Innocenti a member of the ITS3 team**
- **sizable MIT involvement**
 - Ivan Cali (MIT research scientist) stationed at CERN
 - a new postdoc to be stationed at CERN (call just opened - [link here](#))
 - MIT Ph.D. student at CERN, with prospects for a long-term involvement

MIT interest for FY2024

eRD104:

- readout-workflow:
 - design of the readout architecture, optical links development, testing and characterization
 - detector→DAQ data format definition
 - development of the software for monitoring and control (future DCS)
- **1 FTE postdoc**

eRD111:

- design of the mechanical aspects of the inner layers at MIT/Bates
 - cooling design and testing (wind tunnel)
- **1 FTE engineer at Bates (50% senior, 50% junior)**

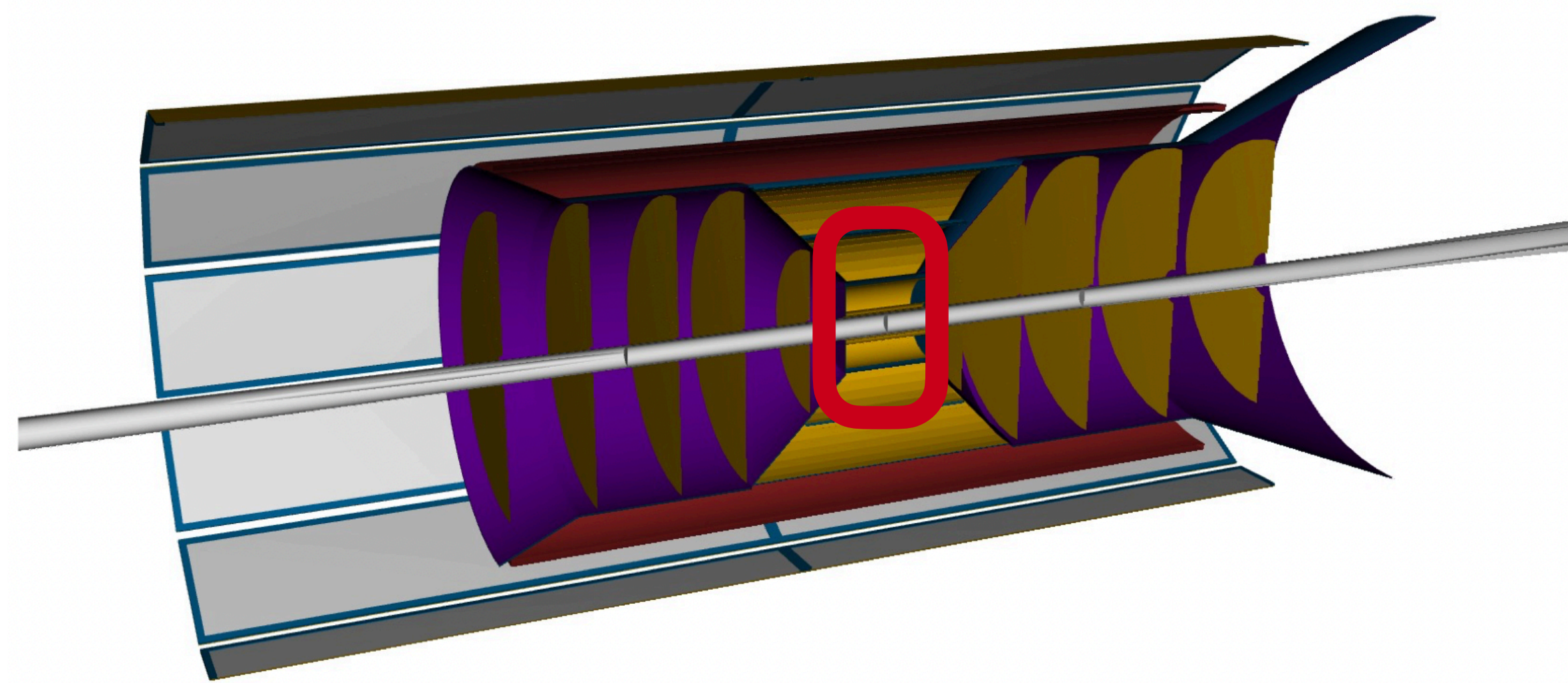
eRD113:

- support the ITS3 team with the characterization of the sensors using the MIT wafer-probe station
 - aging tests/characterization of the sensor+electronic using the MIT climatic chamber
- **1 FTE postdoc**

(Starting from January 2024) Contact person for MIT Si effort: Gian Michele Innocenti

MIT long-term interest in a nutshell

- SVT mechanics and cooling for the first three layers
 - readout (software and FPGA development) and DCS
 - sensor characterization, beam tests, and aging studies
- **contribute to the construction of the three innermost layers, exploiting MIT-Bates as a production site**



**Many thanks for your attention and
for welcoming us to the group!**

BACKUP