

Expression of Interest on Silicon Detectors at EIC

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Institutions collectively involved in this submission of interest:

- University of Illinois at Chicago (UIC)
- National Cheng Kung University (NCKU)

Items of interest for potential equipment cooperation:

- Silicon tracker in the barrel, forward or very forward region
- Tracking and Time of Flight detector based on the LGAD technology

Level of potential contributions are for the item of interest:

We will use our expertise, clean room, test equipment as well as the access to Silicon sensor and mechanical structure fabrication facilities to work on the silicon sensor and mechanical structure design and prototyping.

Assumptions you made as coming from the EIC Project or labs for the item of interest:

While design tools, clean rooms, test equipment and related expertise are available, it is assumed that the member institutions will be able to secure funds from internal, national or international funding agencies, as well as from the project to provide necessary funds for M&S and labor.

Labor contribution for the EIC experimental equipment activities:

Institution Name	Professor	Research Professor	Staff Scientist	Postdoc	Graduate Student	Undergrad. student		Engineer	Designer	Technician	Total Sum
UIC	0.25			1.0	1.0					0.1	2.35
NCKU	0.25			0.2	1.0	0.2		0.2			1.85

It is anticipated that the collaborative effort of the UIC-NCKU consortium to cooperate on the EIC Project is to include (at an annual basis) 0.5 full-time equivalent FTEs of a professor, 1.2 FTE of a postdoctoral researcher, and 2.0 FTEs of Ph.D. students. The technical collaborative effort contributed is to include up to 0.2 FTE of an electronics engineer, and 0.1 FTE of a technician. We anticipate the duration of this collaborative effort to cooperate on the EIC Project to start at the design phase and continue till the detector is fully installed and commissioned at the EIC.

Timing constraints to the submission:

UIC and NCKU are working on the STAR Forward Silicon Tracker upgrade project. This work is expected to end in FY22. UIC is also involved in the CMS MIP Timing Detector (MTD) upgrade project. The work is expected to end in FY26. NCKU is also working on the development of silicon-based particle detectors for space missions. This work is expected to end in FY25. A significant part of the members will proceed with the EIC detector development in parallel, by carrying along our experience gained at the RHIC and LHC experiments and leveraging personnel expertise.

Other information:

Design tools and fabrication facilities for silicon sensors and mechanical structures, as well as clean room, machine shop and testing equipment are accessible at the member institutions. Below is a list of projects in which the member institutions take **major responsibilities**:

- UIC - STAR Intermediate Silicon Tracker 2012-2016
detector module assembly, commissioning, operations
- UIC – STAR Forward Silicon Tracker 2013-2022
overall detector design, silicon sensor design, detector module assembly
- UIC – CMS MTD Endcap Timing Layer based on LGAD technology 2019-2026
new frontend readout chip development: prototype testing and production QA/QC
- NCKU – AMS 2015-2019
radiator design, construction and assembly
- NCKU - STAR Forward Silicon Tracker 2016-2022
module mechanical structure design, construction and assembly
- NCKU Development of Silicon Strip sensor 2018-2024
sensor design, production, test