Expression of Interest – Ultrafast Silicon

Please indicate the name of the contact person for this submission:

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Please indicate all institutions collectively involved in this submission of interest:

Argonne (PHY, HEP, MSD), BNL, KEK, LANL, Tokyo Metropolitan CIT, UC Santa Cruz, UIC, University Tsukuba

Please indicate the items of interest for potential equipment cooperation:

- ✓ *TOPSiDE concept: Ultrafast silicon sensors for TOF (barrel+endcaps)*
  - ❑ *R&D on LGAD sensors*
  - ❑ *Timing distribution system*
  - ❑ *Readout ASIC & CFD development*
  - ❑ *Power requirements & cooling*
  - ❑ *Integration with precision silicon vertexing/tracking system*
  - ❑ *Engineering and construction of the silicon detector system*
  - ❑ *R&D towards a holistic tracking & PID solution for EIC*
  - ❑ *RICH design to complement silicon TOF in forward region*
  - ❑ *Development of online software*

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Opportunities for engagement of other groups

There are many opportunities for collaboration, please contact if you would like to join. We will be holding a workshop on ultrafast silicon for EIC soon.

Additional information you think may be useful for the community to know about your expression of interest.

- ✓ *TOPSiDE: TOF Optimized PID Silicon Detector for EIC, central principle is to simplify the central region and minimize the need for dedicated PID systems*
- ✓ *Team has extensive experience in developing and deploying ultrafast silicon for LHC.*
- ✓ *Recently reached 15ps timing resolution in beamline test (will be published soon), confident we can reach required <10ps timing resolution using 20μm LGAD sensors.*
- ✓ *Closed-loop simulation/reconstruction software developed for TOPSiDE perfect for detector integration and optimization studies beyond ultrafast silicon, plenty of computing resources available.*
- ✓ *Happy to collaborate with other tracking/PID/calorimetry efforts to optimize the barrel, endcaps and transition to forward region.*