OAK RIDGE National Laboratory

ORNL EIC SVT R&D Activities, Interests, and Resources

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U.S. DEPARTMENT OF ENERGY

ORNL EIC SVT R&D Activities

- Existing, on-going EIC SVT R&D and efforts at ORNL:
  - eRD104: Readout Services Reduction (J. Schambach)
  - SVT DAQ representative (J. Schambach)
  - eRD113: Sensor Development (J. Schambach participating in sensor characterization. ORNL has an ITS-3 MLR1 DPTS test setup)
  - EIC generic R&D: Sensor Kapton embedding R&D in collaboration with the ORNL Manufacturing Demonstration Facility (N. Schmidt)

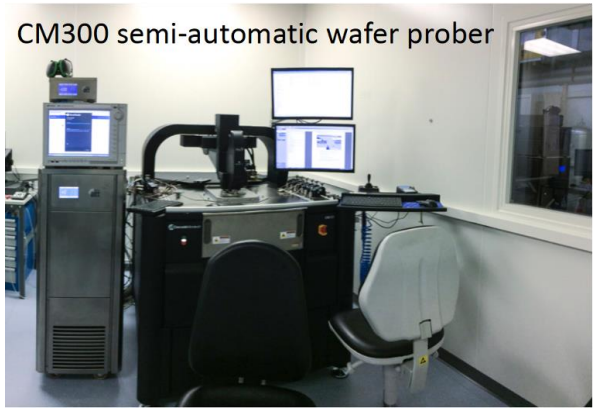
ORNL EIC SVT Interests

- Completing the R&D mentioned above
- Available for leading role in design, development, fabrication, and qualification of SVT readout boards & interfaces to DAQ, DCS, and trigger/timing
- Potential site for qualification/testing of sensors during production
- Note past experience and local equipment and labs
  - LVL3 manager for ALICE-USA ITS2 readout (Schambach)
  - LVL3 manager for all of sPHENIX MVTX electronics (Schambach)
  - –LV3 manager for ATLAS US Phase-II FELIX upgrade up to CD2/3 (M. Benoit)
  - –LVL3 manager for CMS Endcap Timing Layer Sensors and Bump Bonding, plus previous Hybrid pixel/MAPS experience in Timepix Collaboration, ATLAS, CLICdp (M. Benoit)

ORNL EIC SVT Resources

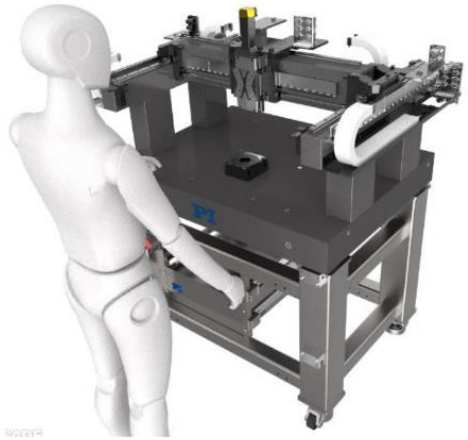
- Fraction of 2 experienced physicists, postdoc, graduate students
- Fraction of several experienced electrical engineers (subject to funding)
- Technicians (subject to funding)
- Multiple microelectronics labs, test equipment, clean rooms (see below)

ORNL Testing and Assembly Facilities



ORNL is investing in Semiconductor/ Microelectronics testing and assembly equipment, including:

- FormFactor CM300xi semi-automatic probe station
  - Accommodate 5 - 300mm sample size
  - Light tight and airtight thermal chamber
  - -60 C to 125 C testing range
  - 8 x DC probe for parametric measurement
  - 2 x RF probes
  - 1 x XYZ robotic probe with optical probing
  - Probe card holder for open, closed top probe cards
  - Fully automated alignment of wafers and dices
  - Programmable for unattended testing
- SET FC150 precision bonder
  - Up to 150mm substrate and chip handling
  - ± 1µm post-bonding accuracy
  - ± 1µRad parallelism with active levelling
  - Force up to 200 kg
  - Temperature up to 400C (~1C/s)
  - Can be operated in fully automated mode
  - Liquid dispenser integrated in the machine for glue, underfill distribution
- High-performance XYZ-Theta gantry
  - 500 x 500 mm work surface
  - ± 0.75µm positioning accuracy
  - 10 kg load capacity
  - ± 25µRad planarity



ORNL will soon have capability to perform sensor characterization and assembly on site, in our Class 1000 clean room and microelectronics labs.