Welcome!

Introduction

Proposed agenda for today:

- (This) introduction to the ePIC SVT
- Interests and planned contributions to the ePIC SVT

  *Request: "we would like to ask you to prepare a few concise slides to identify who your **institutional contact** will be, where you and your colleagues' **interests** are in the SVT, and **how and with which resources you intend/plan to contribute in** the remainder of the **R&D** phase and (separately) during **construction**."*

  Allocated approximately 10 minutes to each institution. Ask for flexibility so we can respect time-zone differences and conflicts. If you or your institution are not listed (yet) as part of the agenda - mea culpa, please simply speak up or reach out by email so we can correct.

- Technical overview of the ePIC SVT
- Discussion
- Close-out, next steps, and AOB

Introduction

Main goals for today:

- Agreed-on work packages
- How the work will be shared among interested institutions during the remainder of the R&D phase,
- How the work will be shared among interested institutions during the construction phase,
- Help help create a common understanding of the current SVT baseline to facilitate efficient collaborative work

Pertinent topics, though not for today's meeting

- If you have not subscribed to the eic-rd-silicon-l **mailing list** (link), please consider doing so. We will migrate to an ePIC mailing list soon, but let's not let that get in the way of efficient communication now. We will, likewise, soon migrate to an ePIC indico area.

- If you are (actively) interested in the SVT, but your institution is not (yet) a member of the ePIC collaboration — please feel free to reach out offline so we help point you in the right direction to become a member (institution).

- The **Project R&D** call — eRD104, eRD111, eRD113 — is out and has a proposal deadline of upcoming July 7, 2023. We will meet weekly on Tuesday's at noon going forward to get this done. Please refer to past Tuesday's indico: https://indico.bnl.gov/event/19740/ and to Rolf Ent's update from the project (slides 3-7) at yesterday's general ePIC meeting: https://indico.bnl.gov/event/19594/ Overleaf templates will become available over the weekend; past participants will have access by default — if you are not a past participant and would like access, please reach out offline.

- The **Generic R&D** call is out as well and has a deadline of upcoming July 14, 2023, c.f. https://www.jlab.org/research/eic_rd_prgm Let's factor it out of today's meeting as well.

- Last, the project has asked for information on test-beam needs between 2026 and 2028 when multiple facilities are paused. If you foresee an EIC need, please reach out offline before June 15 so we can help the inventory and possibly mitigate.

ePIC Silicon Vertex Tracker

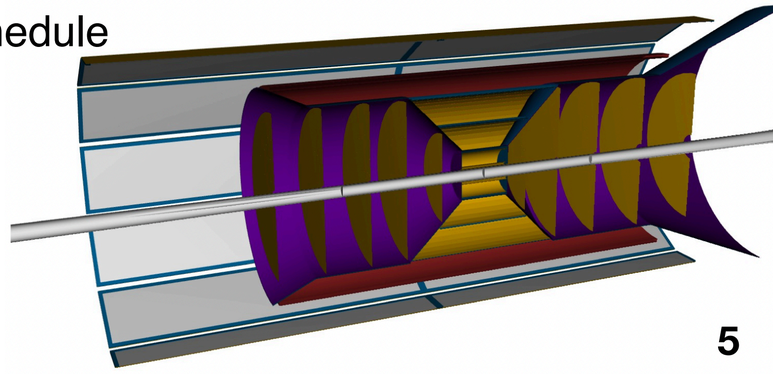
The SVT subsystem is described on the wiki; it is based around a 65nm MAPS sensor and currently consists of five barrel layers (L0—L4), five disks in the hadron-going direction (HD0—HD4), and five disks in the electron-going direction (ED0—ED4).

The **SVT R&D phase** is ongoing. Relevant timelines include:

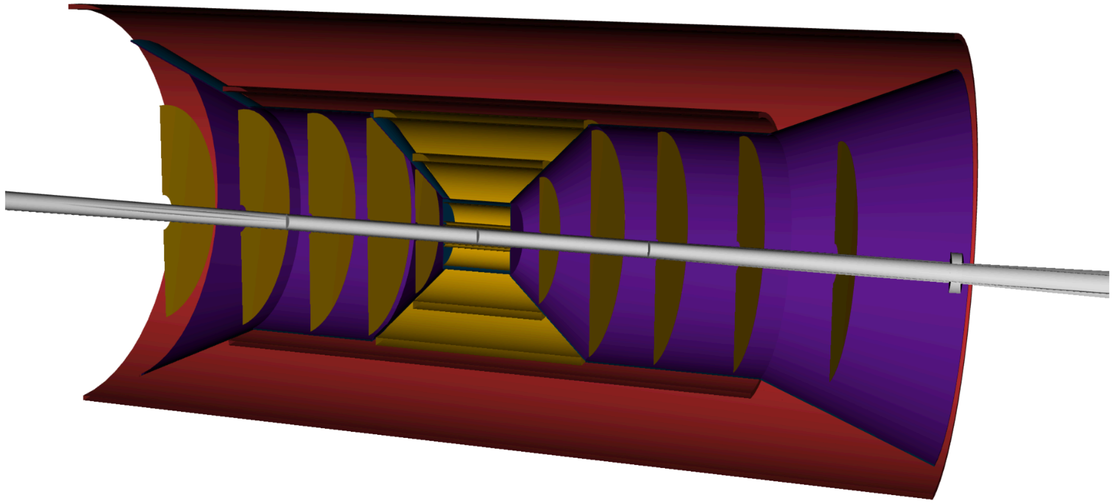
- EIC vertex sensor qualification in September 2026, concurrent with ALICE-ITS3
- EIC Large Area Sensor production start in (not before) February 2027

The **SVT construction phase** will (mostly) follow the R&D phase. Relevant timelines include:

- CD-3, Approve Start of Construction / Execution, is currently anticipated for Spring 2025,
- SVT construction is estimated to take 3—4 years in a technically driven schedule



October 2022 Simulation Geometry



Updated barrel reference geometry:

- 2 curved silicon vertex layers, r = 36, 48 mm, l = 270mm
- 1 curved silicon dual purpose layer r = 120mm, l = 270mm
- 1 stave-based sagitta layer r = 270 mm, l = 540 mm
- 1 stave-based outer layer r = 420 mm, l = 840 mm

Note: the three curved layers are also called *inner* layers, and the two stave-based layers are also called *outer* layers.

Updated disk reference geometry:

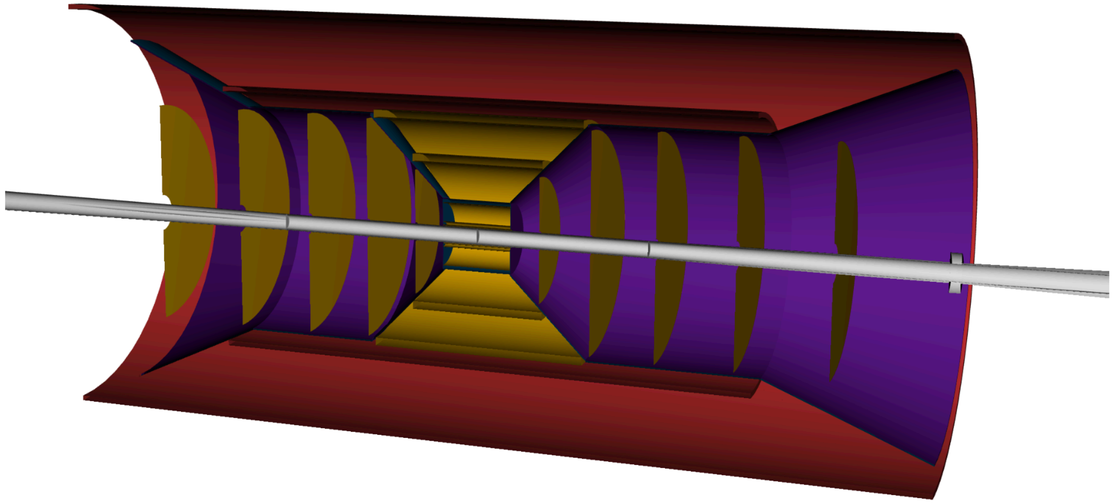
- 5 disks on either side of the nominal IP,
  - z = -250, -450, -650, -900, -1150 mm
  - z = 250, 450, 700, 1000, 1350 mm
  - inner radii >= 36 mm, outer radii <= 430 mm

1. Let's agree on the wiki-nomenclature (at least for today): the barrel layers are **L0—L4** from inner to outer radius, the disks at negative z are **ED0—ED4** and those at positive z are **HD0—HD4**, in both cases from small (inner) |z| to large (outer) |z|.

2. The SVT will be based on 65 nm MAPS development, currently under development within ALICE-ITS3. The lengths of SVT L0—L3 and their radii above derive from the wafer-scale sensor dimensions, as they were known to us past October 2022.

3. Since the dimensions have evolved since October 2022, the precise dimensions will need to be adjusted. The active length in z of the wafer-scale sensor, for example, is projected to be approximately 260 mm and the physical length in z approximately 266 mm, instead of the 270 mm listed above. The simulation dimensions still need to be updated; focus on the concept's logic, not the exact numerical values.

October 2022 Simulation Geometry



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4. L0 and L1 will each have four curved wafer-scale sensors. L2 will have eight; momentum resolution is particularly sensitive to material in this layer. L3, L4, and all disks will be constructed out of the so-called EIC Large Area Sensor (EIC-LAS), which is based on ITS3. The radius of L4 is determined by high-momentum resolution and its length derives from this. Material in L3 and the disks needs to be kept low; X/X_0 ~ 0.24% per disk is the target (average) and even lower would be beneficial.

5. The service/support cones will all project back to the nominal vertex (0,0,0). Disks ED4 and ED3 may need to move in slightly to accommodate an outer MPGD disk. The outer radius of 430 mm is not a hard envelope value, but it is not unconstrained either. Barrel services will likely end up being routed out along (extensions of the) innermost cones to a radius of approximately 0.6 m. The outer cylinder in the disk region will need to co-exist with an MPGD barrel between $0.4 < r < 0.6$ m. The beam-pipe “fans out” at large-|z| and will need to be baked out with the silicon in place.

6. Much more in Laura’s talk later today.

ePIC SVT Detector Subsystem Collaboration

The SVT-DSC came together to develop, construct, and operate a well-integrated, large-acceptance, low-mass, high resolution tracking and vertexing solution for ePIC based on Monolithic Active Pixel Sensors (MAPS) in 65 nm technology,

By consensus of the initial membership, Laura and Ernst will serve as technical coordinator and lead in the startup phase.

Imperative to advance our earlier initial discussions on:

- Who will participate (during the remainder of the R&D phase, and during construction)?
- Who will do what?
- What resources are available to / within the SVT-DSC?
- What is not covered or missing?

Initial discussions may be found e.g. at https://indico.bnl.gov/event/17418/. That is, we are not starting from ground zero, but we certainly are not "locked in." These discussions simply need updating and revision — one of the goals for the kickoff meeting today.

Work package structure — multiple ways to do it. Next slide has a possibility; let's discuss now and/or in the afternoon. Arriving at an agreed-on work package structure is another goal for the meeting today and will get us prepared towards integration with the project structure. Suggestions for work package leads are certainly welcome, today or later, but let's focus first on a preferred structure.

WP1	Sensor development	Design •Contribution to ITS3 ER2 and ER3 •EIC LAS v1, v2, production Characterisation •Lab, test beam, irradiations	(Most closely related to eRD113 project R&D)
WP2	Mechanics and cooling	•Mechanics of bent vertex layers •Air cooling for vertex layers •Support structure for sagitta layers and disks •Cooling for sagitta layers and disks	(eRD111 project R&D)
WP3	Sensors electrical interfaces	•FPC from sensors to end of layers/disks •Wire bonding (sensor to FPC) •Connection to services (FPC to services)	(Aspects within eRD111 project R&D scope)
WP4	Readout and powering	•Power regulator; SP architecture (data transmission, current source, grounding) •On-/off-sensor data handling, full chain until FELIX	(eRD104 project R&D)
WP5	Integration	•Overall mechanical support and integration •Detector cabling (i.e. cables and routing) •Power supplies and cooling plant •Close collaboration with project engineers	(Aspects within eRD111 project R&D scope)
WP6	Simulations	•Link to tracking working group •(Detailed) SVT detector description	
WP7	Interlocks, slow control, run control, monitoring	To be activated later on	

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- Interests and planned contributions to the ePIC SVT

  Proposed order:

UK groups	*now*
Korean groups	
Czech Republic groups	*~11am*
ORNL	
MIT	
INFN	
Purdue U.	*~noon*
BNL	
LANL	
LBNL	

  Does this order work for everyone?

- Technical overview of the ePIC SVT
- Discussion
- Close-out, next steps, and AOB