EIC R&D @ LBL
Based on eRD111 Proposal

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LBL EIC meeting

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R&D into stave/disc construction, cooling, overall infrastructure

- Stave/disc construction
  - Mechanical (& electrical?) design based on ITS3 type sensors
  - Optimizing disc design in particular
  - Targeted R&D on the services
    - Cooling, mechanics
- Cooling
  - Air? Liquid?
  - Carbon foam between mechanical structures
    - Thermal tests, vibration
- Overall Infrastructure
  - Mechanical structures, carbon foam
    - Cooling, stability
  - Prototypes for both discs & staves structures

Coarse Timeline

- FY22
  - R&D into stave/disc construction, cooling, overall infrastructure
- FY23
  - R&D & prototyping of above
- FY24
  - More detailed prototyping of above
  - EIC variant of ITS3 sensor for staves & discs
- FY25
  - Use EIC variant prototypes for prototyping of above

From eRD111 for FY22

- Staves & Discs deliverables
  - Conceptual designs w/analysis ready to be prototyped
  - Initial simple prototype “proof of concept” test pieces to be used in cooling and mechanical testing
  - Written reports detailing the results and evaluating suitability for final design
- Mechanics, integration, and cooling deliverables
  - Design concepts for the full set of detector supports including cylinders, shells, service channels, connection points to global supports w/detector assembly, integration, and connection to services aspects addressed.
  - Initial analysis of the design and possibly prototype pieces of the carbon fiber structures involved in the tracking detector – written
  - Analysis of the cooling options for staves & discs. Preliminary design of water cooling options with segmentation and architecture. Investigation into and analysis of using air cooling in a sandwiched carbon foam configuration for staves and discs. Written.

FY22

- Stave & disc (focus on disc) conceptual design
  - RNC labor
  - Tracking group collaboration
- Initial analysis & design of mechanical structures
  - RNC, engineer
  - Finite element analysis, manufacturability, stiffness, vibration
  - Tracking group simulations
- Analysis of cooling options, focusing on air
  - RNC, engineer, technician
  - Thermal analysis
- Deliverables:
  - Design studies → Written reports for all 3, CAD models, simulation models
  - First prototype: Carbon foam between carbon fiber
    - Stiffness, thermal studies, vibration, bending
- Collaboration/Overlap with EICSC (& ITS3) on:
  - Stitched sensors, studies on modules (# of sensors on FPC), tooling to assemble & construct

FY23+

- More specific design of stave/disc construction
  - More integration with tooling, modules
    - Overlap with EIC sensors
  - Prelim prototypes of composite structures
- Further studies on cooling
  - Focus on what preliminary studies have found (air? Water?)
  - Prelim prototypes
- Mechanical support structures
  - Continue prototype tests (stiffness, thermal, etc.)
  - Use prototypes to assess assembly & tooling
    - EIC sensors