**Overarching goal of the SoLID FY22 work is to advance the pre-conceptual design**

It is crucial to continue to further capture the collaboration excitement generated by the recent SoLID pre-R&D completion and the CD-0 science review.

With the pre-R&D completed[[1]](#footnote-2) there are no technical showstoppers for SoLID remaining.

More specific goals of the FY22 work will be research-tasks to address the recommendations of previous reviews. This includes:

- Preparation for a beam test in FY22 under high luminosity (high rate and high radiation) conditions of the detector components and DAQ system, as suggested by the Feb 2021 Director’s Review of SoLID. The Cherenkov detectors had a high-rate test in 2020 as part of the pre-R&D. The focus in FY22 will be on the electromagnetic calorimetry and VMM3-based readout of the GEMs. The latter is more on the foreground now for in-situ Hall tests given the SBS experience that shows noise levels can be drastically different in the Hall than in GEM bench tests. Beyond lab and existing user resources, a successful beam test requires a dedicated 1.5 FTE and $200K materials.

- Cherenkov mirror study and prototyping – main emphasis is on mirror fabrication methods to advance the pre-conceptual design including adhesion methods and radiation testing. This can also include the prototyping of the mirror mounting.

- Preparation of a unified end-to-end software framework covering SoLID’s entire life cycle from design to construction to physics analysis. This was recommended in 2015 Director’s Review to develop “with high priority and increased resources”. This supports a range of activities starting from important scientific guidance for detector design, through integration of streaming readout and use of AI/ML in SoLID commissioning and data taking, to ultimately high-level SoLID physics data analysis and expedient extraction of physics results.

- Ensuring full compatibility with a streaming readout scheme. This was suggested during the March 2021 Science Review. The largest hurdle for a SoLID streaming readout model is the tracking in high background and high-rate environment. This has led to emphasis on building and testing a streaming version of the VMM prototype. FY22 work consists of further validation through tests and of simulation of event size and data processing to evaluate the amount of computing and storage resources needed.

1. The low-current cold SoLID magnet test, with modern I&C and new cryo control reservoir is planned for this Fall due to Test Lab High Bay scheduling issues. [↑](#footnote-ref-2)