Detector Subsystem Template

Please use 12point font; One Table, two or three figures per sub-system

1 Name of system / Purpose and scope
Name: Electron Endcap EM Calorimeter (EEEMCal)
Purpose and scope: Precision scattered electron and final-state photon detection in the region -3.5 < eta < -1.0

2 Describe Technology Choice, with reference to Yellow Report. What is different, same, improved?
Same as reference technology choice in Yellow Report for Electron Endcap EM Calorimeter. Inner part consists of PbWO4 crystals, outer part consists of SciGlass. Readout: SiPM

3 Expected performance of system versus yellow report requirements including a table.
Anticipated performance of the system is similar or better as compared to the Yellow Report as coverage and material have been optimized.

4 Limitations if any for EIC physics
Nearly all physics processes require the detection of the scattered electron. The requirement of high-precision detection is driven mainly by inclusive DIS where the scattered electron is critical to determine the event kinematics. The EEEMCal will address this need.

5 Discussion of Risks and R&D needs
(e.g. Is it a well-established technology or an emerging one? Are there comparable systems in operation using this technology? Will R&D provide risk mitigation, and on what timescale? Is there a backup technology? What would performance or cost impact be?)

Crystals

- Well-established technology
- Comparable systems are in operation (JLab EM calorimeters, PANDA EMC, CMS EMC, etc.)
- No R&D needed, crystals are available commercially from two vendors
- There is no direct backup technology though if R&D successful SciGlass may serve as backup if crystals were not available
- If no crystals, high-precision electron detection would be impacted and EIC physics may be compromised

SciGlass

- Emerging technology
- Similar systems have been used at Fermilab
- R&D will provide risk mitigation: Validation of large-scale SciGlass; part of ongoing Project R&D
- Backup technology: Lead Glass

Possible performance degradation that needs to be investigated

6 Upgrade path if any
No upgrade path for crystals. Possible upgrade path for glass: start with lead glass and upgrade to SciGlass.

Include at least one performance plot within the ~2 page total per detector.

Page limits on the next page

ATHENA Detector (25 Pages)

- Requirements in YR & achieved(?) 1 page or a table?
- Magnet 2 pages
- Tracking System 5 pages
    - Si pixel vertex detector, incl. intro to next gen pixel technology (2 pages)
    - Si tracking barrel & disks (1 page)
    - Gas micropattern detectors (1 page)
    - Hybrid tracker (1 page)
- EM Calorimeters 3 pages
    - High resolution crystal electron endcap (1 page)
    - Barrel & hadron endcap EMCAL (2 pages)
- Hadronic Calorimeters 2 pages
- Particle Identification 4 pages
    - DIRC
    - RICH Detectors
- Far Forward and Far Backward Detectors 2 Pages
- Polarimetry and Beam Monitoring 2 Pages
- Data Acquisition and readout electronics 1 Page
- Software 1 Page
- Integration Principles 1 Page
- Upgrade Path 1 Page