ProtoDUNE II High Voltage System Electrical System Document Review for Final Design Review

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1. **Findings**
* The electrical system designs were reviewed for the ProtoDUNE II HV system. The documentation available for review is listed at the end of this review summary.
* Design documents were provided for the High Voltage subsystems, including the Cathode Plane Assembly (CPA), Field Cage, HV Feedthrough, Camera, and Ground Plane pickoff instrumentation.
* Electrical schematics, printed circuit layouts and bills of material were provided for printed circuit boards.
* The mechanical drawings of the CPA detailed electrical connection and hardware connections. Information on wires and cables were provided in additional documents.
* The Grounding Document is located in EDMS 2373456(V.1). It details the HV delivery from the power supply to the Feedthrough, the CPA and Field Cage, and the monitoring and control system.
1. **Comments**
* The Grounding Document contains a schematic of the HV delivery system. The cable is specified, however, details of the mechanical design of the filter box as well as connectors and components used were not found.
* The Grounding Document includes a high level drawing of connections to the Field Cage. Simplified depictions of the field cage termination boards are included. It would be useful if EDMS references were provided for the actual full schematics of these modules. Also noted was that it was unclear that the shields of the coax cables were connected at the feedthrough penetrations as required (Figure 3).
* The Grounding Document also details the connection to the Ground Plane Pickoff monitor and the bias voltage filter. Again, the reference of the coax shield to cryostat ground is not clear in the document Figure 3.
* The Grounding document also notes that the electrical design of the connections between the cameras, cables, power supplies, and Ethernet switches is not yet complete; therefore, it cannot be reviewed at this time.
* It is noted that the document listed as “Camera\_Cable\_Info.pdf” in EDMS 2589622 is a schematic of the warm bias voltage filter board, rather than information on the Camera cable.
* Information for the various printed circuit boards has been posted in two separate areas, with all schematics in one EDMS entry and all PCB layout and BOMs posted in another EDMS entry. For purposes of review, it would be preferable to have each PCB represented by a single EDMS entry will all relevant information contained within.
1. **Recommendations**
* Document the HV Filter Boxes to include details of connectors, mechanical design and component choices.
* Consider adding EDMS references to top level documentation when simplified drawings are used to represent a more complex schematic.
* Edit grounding diagram to clearly show connection of coax shields to detector/cryostat ground at the feedthrough penetrations.
* Complete and post camera instrumentation documentation.

