**DocDB 6721**

**DUNE Interface Document: SP PDS (Calibration Component)/HVS**

**Definition:** This document describes the interface between the DUNE SP Far Detector Photon-Detection System (SP-PDS) and SP High Voltage System (HVS). In particular we concentrate on PDS Calibration/Monitoring system that is planned to have components installed with the HVS Cathode, and through Field Cage strips and File Cage ground plane. This document describes the necessary interfaces for both SP-PDS and HVS to complete the design, fabrication and installation of their subsystems. An additional document describes implementation of proposed PDS reflective foils with HVS Cathode.

**Hardware:** The system will be used for PDS monitoring purposes during commissioning and for standard experimental operation. A pulsed UV-light system will cross-calibrate and monitor the DUNE-SP photon detectors. The hardware consists of warm and cold components. By placing light sources with diffusers on the cathode planes, the system is designed to illuminate the photon detectors embedded in the anode planes. The details on PDS/APA interface are described in DUNE docdb-6667. Cold components of the calibration system (diffusers and fibers) interface with the HVS. Diffusers are installed at CPA, and therefore reside at the same CPA potential. Qaurtz fibers are insulators used to transport light from optical feedthroughs (at the cryostat top) through Filed Cage ground plane, and through Filed Cage strips to the CPA top frame. These fibers are then optically connected to diffusers located at CPA panels. Required fiber resistance is defined by HVS requirements to ensure the cathode is protected from shorting out due to fibre conductivitiy. PDS hardware components will be designed and fabricated by PDS.

**Testing:** Components of such system are being tested with ProtoDUNE. Additional tests will be managed between PDS and HVS if necessary, including a test stand with shared responsibility. Quartz fibers will be included in the HVS test planned for the validation of the HVS final design. HVS will verify HV design and operation without discharges that could cause light emission observed by PDS should this be a concern.

**Integration:** Initial checkout-test of calibration components will be performed at home institutions, This will be followed with tests in a dedicated PDS integration facility are, including a cold-box style operation. A DAQ vertical slice test stand will be used to test communication protocols with calibration modules, and verify basic functionality. UV light from calibration system will be observed by photon-detectors and the data will be recorded and analyzed to verify performance. The PDS consortia will provide support for PDS integration and operation.

**Installation:** Responsibility for fabrication/installation of PDS Calibration components is assigned to PDS

**Commissioning:** PDS will provide staffing for commissioning of PDS calibration system in the cryostat.