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Next-Generation of Power-over-Fiber for HEP Detectors and Advanced Physics Instrumentation

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Power-over-Fiber (PoF) technology provides an alternative solution for delivering electrical power to electronics operating in harsh environments with high-voltage isolation requirements or electromagnetic interference. Recently, the novel application of PoF technology was successfully demonstrated for powering the Photon Detection System (PDS) of DUNE prototypes at CERN. Lessons learned from these deployments motivated the exploration of PoF systems operating at 1470 and 1550 nm.

This talk will summarize R&D results from the next generation of PoF technology, including the design and development of laser driver electronics, characterization of optical power delivery, optical-to-electrical power conversion efficiency, and evaluation of the response of silicon photomultipliers to these optical sources. These results will serve as the foundation for designing a PoF system capable of powering large-area photon detectors proposed for DUNE Phase II, as well as for potential applications in other research fields.

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