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Large Area Picosecond Photodetector for the Upgrade II of the LHCb RICH

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The Large Area Picosecond Photodetector (LAPPD) is a commercially available photon detector based on microchannel plate technology (MCP), which has garnered significant attention from the scientific community due to its large size, outstanding timing resolution, high gain, and low dark count rate. With a large sensitive area of 200×200 mm^2, the LAPPD is particularly appealing for Ring Imaging Cherenkov (RICH) detectors in particle colliders, neutrino experiments, as well as applications in medical imaging and nuclear non-proliferation. The LAPPD 97 generation-II model purchased from INCOM (US) uses a capacitively coupled array of 64 (8×8) square pixels with a granularity of 24×24 mm^2 to readout the photon signal. A custom backplane, designed to improve the spatial resolution, uses pixel size of 2.9×2.9 mm^2 and covers a limited area of the detector. The LAPPD coupled to the LHCb RICH fast electronics readout chain was tested at CERN SPS across several test beam campaigns. The results will be presented together with the first quantum efficiency and the rate capability measurements for the LAPPD 97. Further tests are planned to explore the limits of this device in rate and timing capabilities.

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