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Development of solar blind UV extended APD for the readout of Barium Floride crystals

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In order to take advantage of the very fast scintillation component of barium fluoride (decay time 0.9 ns at 220 nm) it is necessary to have a fast photosensor with high efficiency in the UV that is also able to discriminate against the larger slow (decay time 650ns at 300 nm) scintillation component. We have developed a large area avalanche photodiode photosensor that has high quantum efficiency at 220 nm, strong discrimination against the 300 nm component and good rise and decay times. This sensor makes it possible to build a radiation-hard calorimeter based on barium fluoride for the Mu2e experiment at Fermilab that has good energy and time resolution and high rate capability.

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