

3rd International Conference and Exhibition on **Lasers, Optics & Photonics**

September 01-03, 2015 Valencia, Spain

The potential of GaN-based devices for UV space astronomy

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Astronomers are always trying to detect fainter and fainter objects. The desire for low light-level observations leads to a requirement of high DQE on one hand, and as close to zero net dark counts as possible on the other hand. The workhorse for broad band (~90nm -300 nm) vacuum UV detection has been the micro channel plate (MCP) cesium coated. These have with blocking filter for the visible band, only about 5% detection quantum efficiency. A clear contender is an avalanche photo diode (APD) made with a wide band-gap semi-conductor such as GaN. The wide band gap obviates the need for visible light blocking filter. In order to compete with the MCP, however the net dark count should be in the range of 0.5-1 cts/cm². The author will show how this is possible to achieve with GaN. To date, a single APD element has been made, such that an array of these would result in a camera with a factor of >3 increase in DQE over an MCP with equivalent low dark count rate. Further, the author will also show that factors of 4-10 improvement over the MCP are possible while maintaining the low dark count rate.

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