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14.12 A large-aperture high-sensitivity avalanche image intensifier panel

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A large-aperture high-sensitive image intensifier panel consists of an avalanche photodiode array and a LED array was developed. The device has 60% quantum efficiency, 105 photon-to-photon gain, 70-ns time resolution. A gate mode is also available. A panel size is typically 20 cm large but it can be increased with no limitation. An image resolution is limited by the size of a pixel of current avalanche photo diode array which is typically 2mm, although it can be improved. It can be operated with a small voltage supply, typically +57 V. This device can be applied for a various field, such as X-ray or neutron imaging device when coupled with a scintillator. A scintillation light from a scintillator (˜10000 photons) can be amplified to eye-visible bright light. The device was demonstrated as a neutron imaging device coupled with a scintillator and a normal CCD camera. A DD fusion neutron beam generated by a high power laser GEKKO XII irradiated to the devise and a neutron shadowgraph image was successfully obtained with a much smaller neutron flux (104 n/cm2) than any conventional neutron cameras.

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