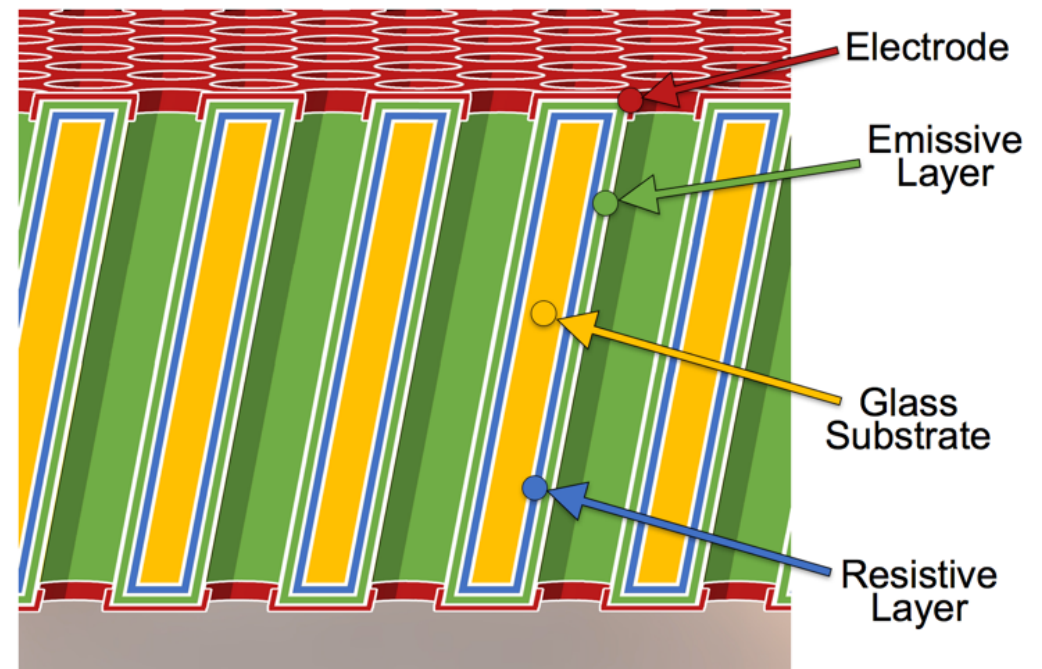
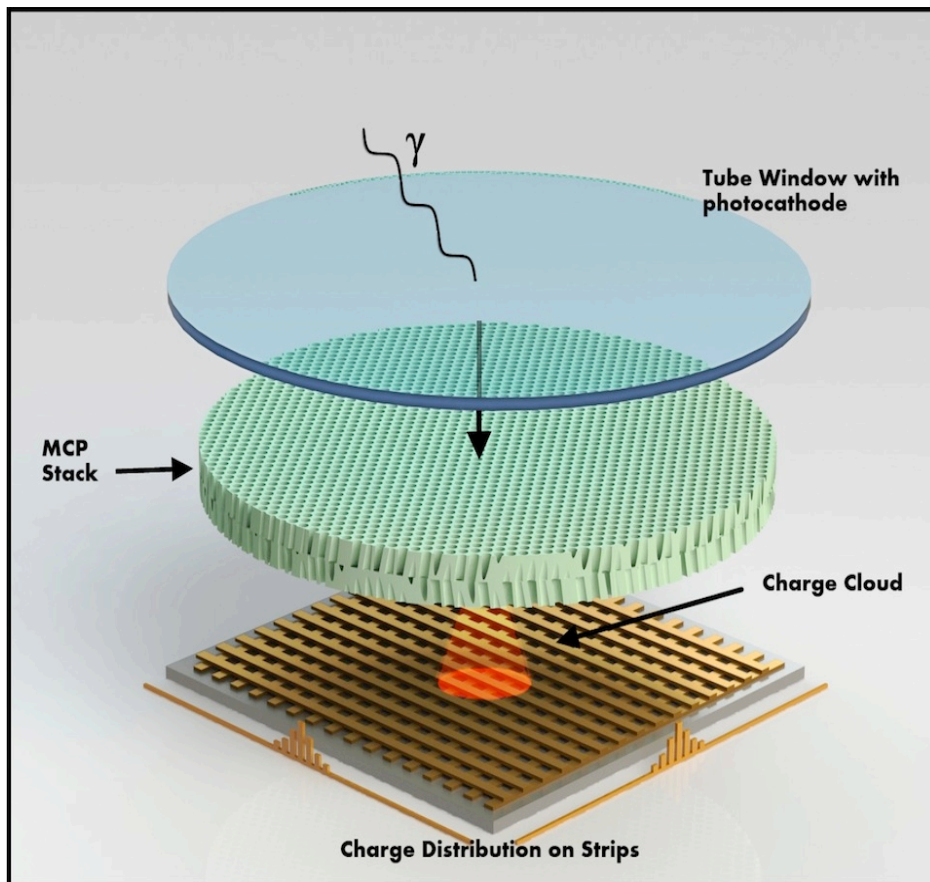


High Performance Photon Counting Microchannel Plate Detectors

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Borosilicate glass substrates are functionalized with atomic layer deposition. Resistances can be tailored to suit the application. Materials with high stable secondary emission (Al_2O_3 and MgO) can be used since they are decoupled from the substrate.

MCP Detector Achievements and Needs For the Next generation of Space missions:

100 mm & 200 mm 10 μm MCP formats

100 mm demonstrated, need 200 mm

100 mm & 200 mm XS formats

100 mm demonstrated, need 200 mm

Open face and sealed tubes

Open face demonstrated, need 100 mm sealed tube development.

Spatial resolution 20 μm FWHM (resel)

100 mm demonstrated, need 200 mm

Electronic spatial sample binning $\leq 5 \mu\text{m}$

$\sim 6 \mu\text{m}$ demonstrated over 100 mm

Global 10 MHz event rates

New ASIC in development for 10MHz rates

Local counting rates $\geq 100 \text{ Hz/resel}$

$\geq 100 \text{ Hz/resel}$ demonstrated for small detector formats, extend to 100mm

Cylindrical and Biconic focal planes

Cylindrical demonstrated, show biconic

High QE 100 nm – 200 nm

$>40\%$ CsI demonstrated, GaN, bialkali & CsI hybrids need further development

Improved MCP gain stability

$>5 \times 10^{13} \text{ events cm}^{-2}$ demonstrated

Low background rates

$<0.03 \text{ cm}^{-2}\text{s}^{-1}$ demonstrated, also $\div 3$

High radiation rejection

MeV gamma sensitivity, test rejection by timing coincidence & amplitude