

Seeing the invisible – The Timepix way

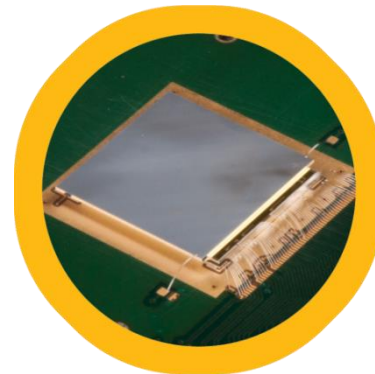
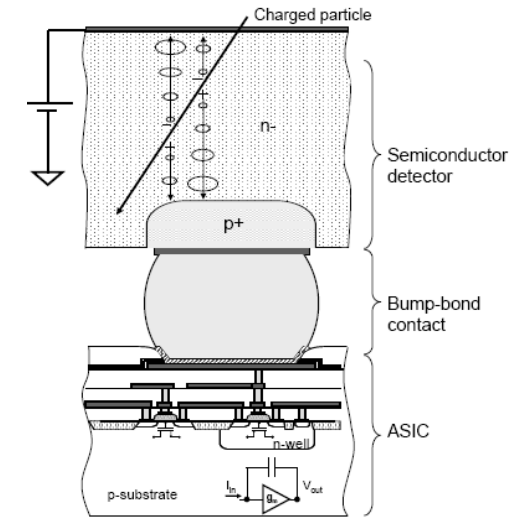
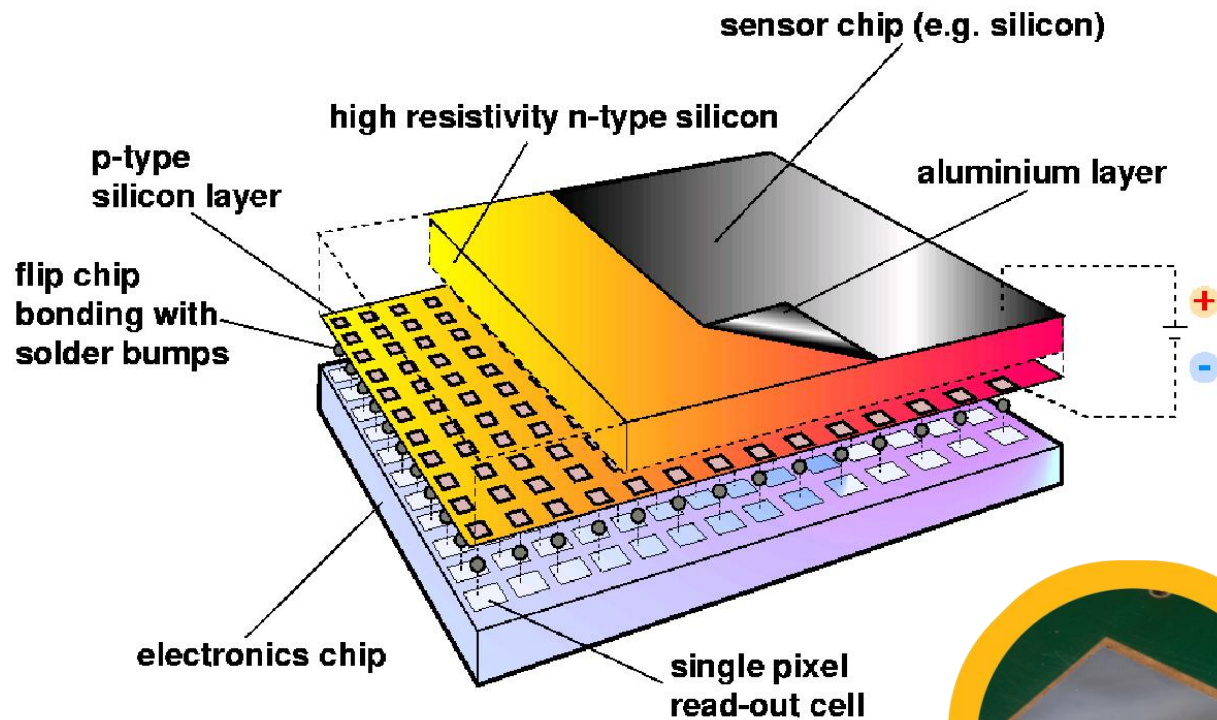
By

Group 4



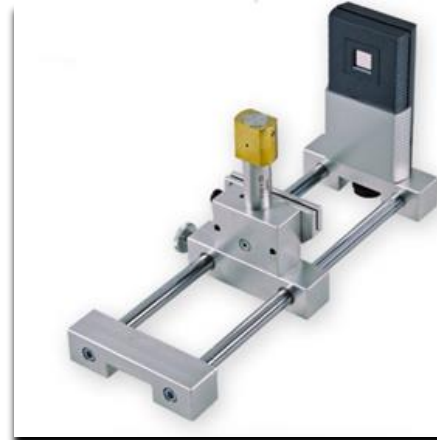
Starring: Mabena Chemist; Karl A. Van Niekerk; Elisha Indarjit ; Obakeng Maphane; Lehumo Mashishi; Fortune Mhlanga; Humphry Tlou.

The star of the show...

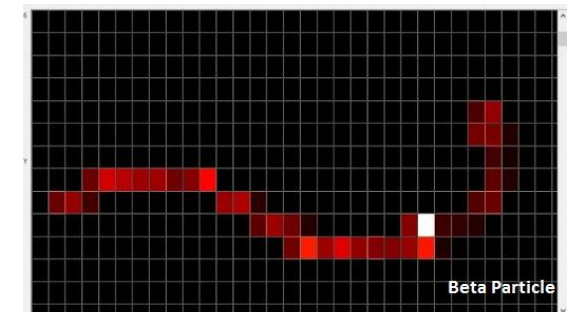
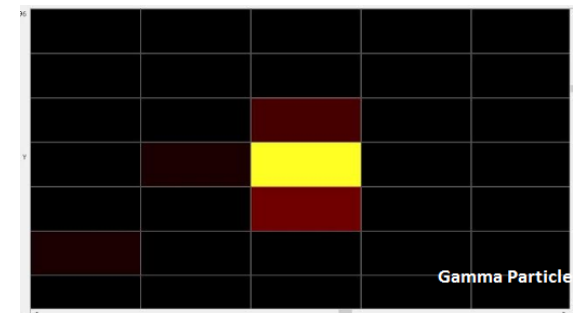
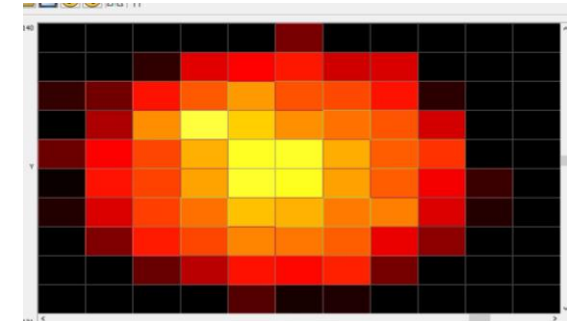
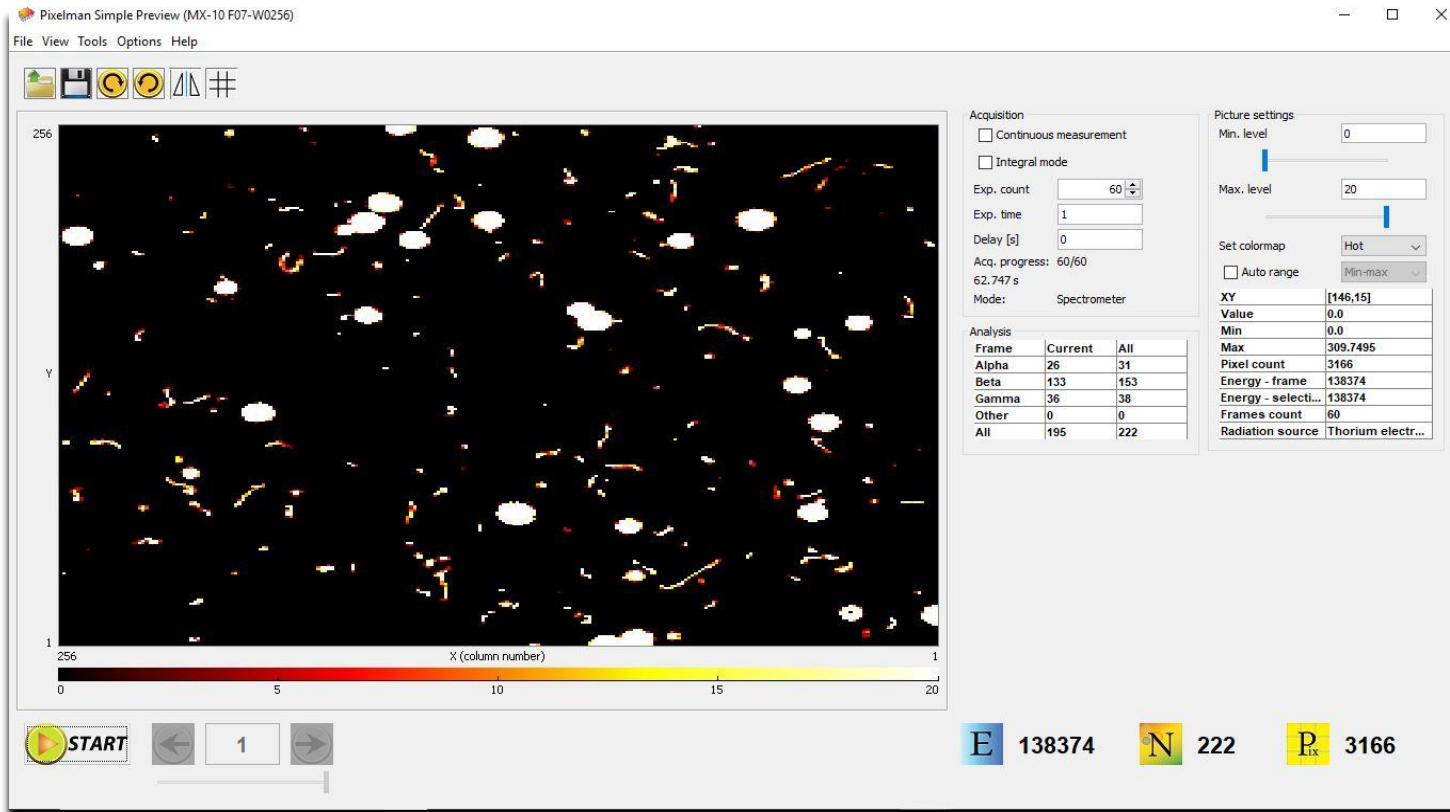


14 x 14 mm detector dimensions
256 x 256 = 65 536 pixels
55 x 55 μm single pixel pitch
300 μm sensor thickness

The kit ...



Particle these tracks...



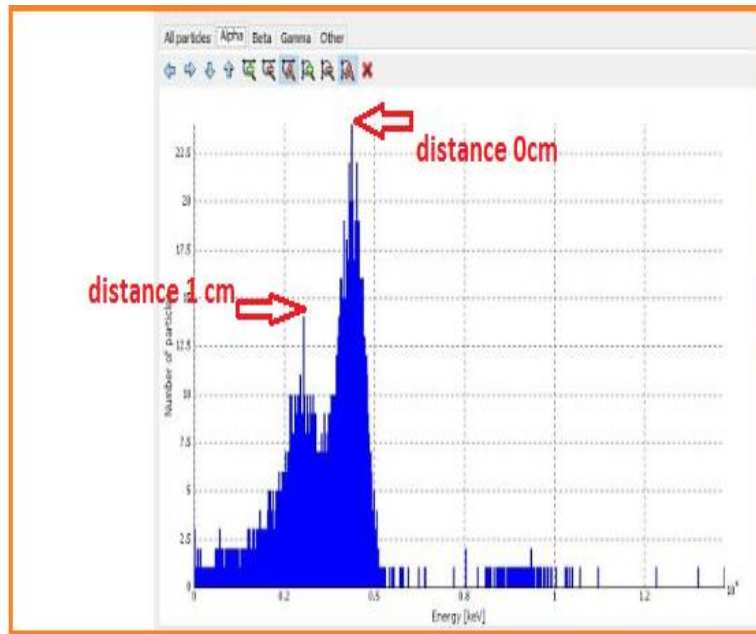
Peaks and numbers...

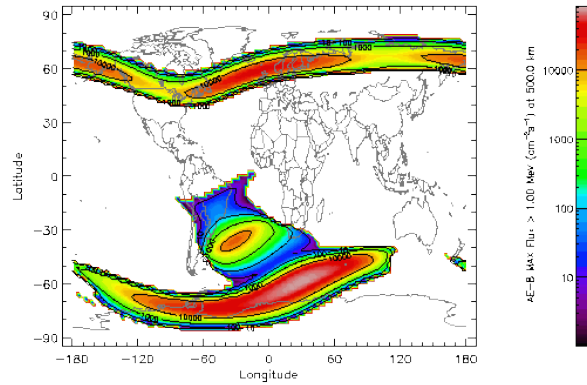
Speed of alpha particles		speed of the light $c = 300\,000\,000\text{ m/s}$							
E_0 [keV]	3.74E+06								
E_k [keV]	4536								
v [m/s]	1.48E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
v/c ·100%	4.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Speed of beta particles									
E_0 [keV]	511								
E_k [keV]	725								
v [m/s]	2.73E+08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
v/c ·100%	91.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

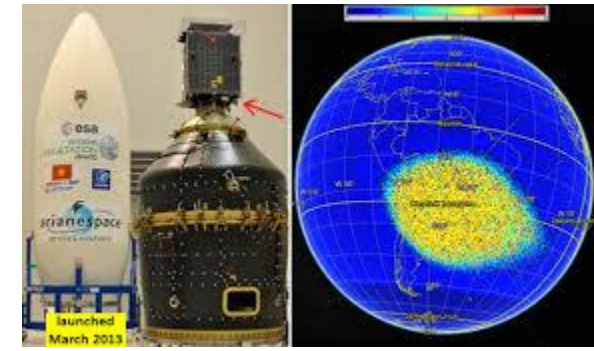
$$E = E_0 + E_k$$

$$v = c \sqrt{1 - \frac{1}{\left(1 + \frac{E_k}{E_0}\right)^2}}$$





TimePix Applications



Medical Imaging

Characterization of Ions, Radiation Therapy, Particle Tracking
(Medipix)

Nuclear Safety

Accidents, Exposure, Fallout, Shielding, Mineside Dust, Ore & Nuclear Materials Processing, Fuel Production, Nuclear Waste Disposal

Exposure Limits

Hazardous Materials, High Radiation Environments, Shielding and Protection

Materials Testing

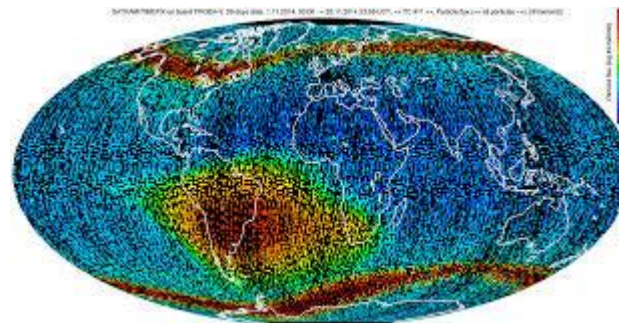
Composites & Materials Properties, Performance and Processing (Ceramics, Metals, Polymers)

Environmental Monitoring

Contamination, Water Quality, Food Quality, Soil Quality, Background Radiation, Fallout, Spills, Leakage

Education

Classroom Demonstrations (Secondary and Tertiary Level), Nuclear Industry Training, Nuclear Safety and Security, Research & Development



Recommendations and Conclusion