

Absorption of Alpha Particle Energy in the Air – Evaluation of Energy Histograms

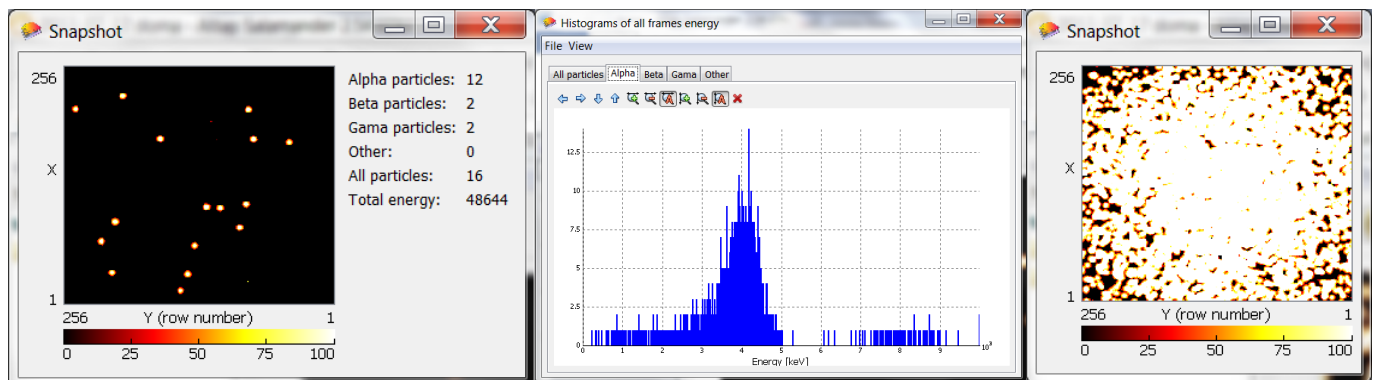
extract from the *Experiment Guide* by Dr.Vladimir Vicha (IEAP CTU Prague) and Dr.Peter Žilavý (Department of Physics Education - Faculty of Mathematics and Physics – Charles University in Prague)

Alpha particles have high ionising effects and quickly lose energy even when travelling through the air. The mean range of alpha particles emitted from americium is about 4 cm in the air.

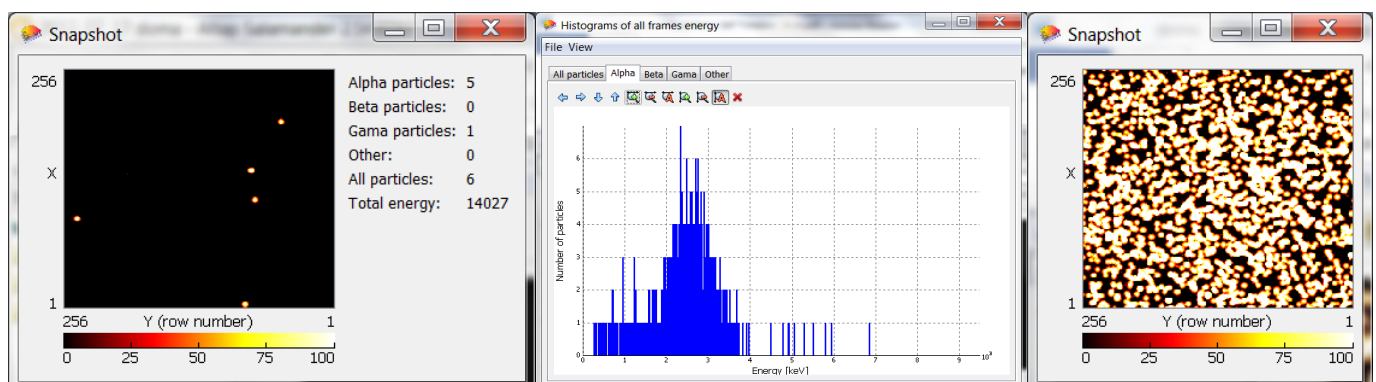
Simple preview: Mode spectrometer, Exp. Count 1000, Exp. Time 0,02 s, Bias 18 V, Analysis type Basic, Finite count of steps - checked, Set color map Hot, Min. level 0, Max. level 100.

Procedure: Fix the MX-10 detector into the adjustable positioner and select the sieve as the particle outlet hole (position 2). First, move the emitter as close to the detector chip as possible. Take a *Snapshot* of a frame, display the energy histogram (*Tools – Histogram of particle properties – Energy-all frames*) and also create an integral frame (*Tools – Integral frame*). Gradually move the emitter away from the chip.

Emitter close to the chip

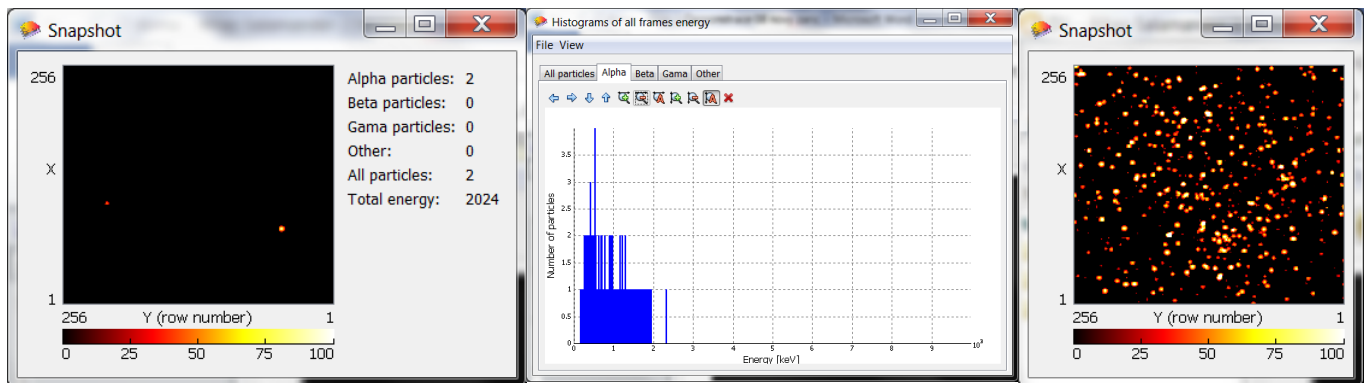


Move the emitter away by 1 cm

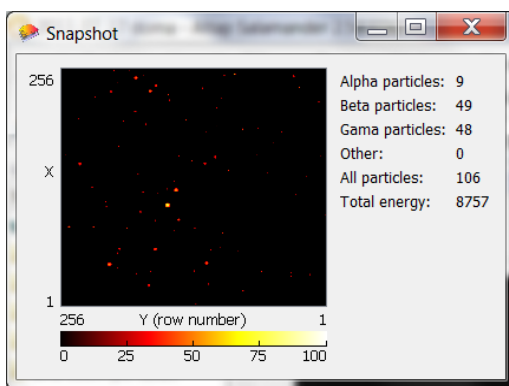


Move the emitter by 2 cm away from the original position

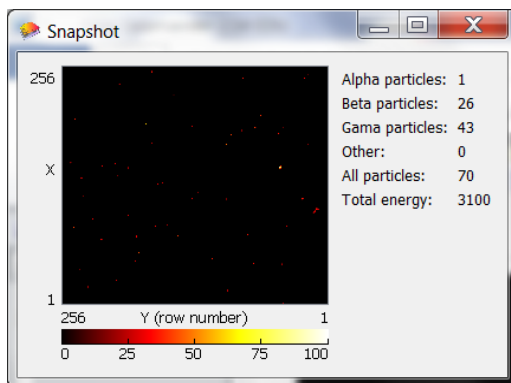
Integral frame



Move the emitter by 2,5 cm away from the original position



Move by 3 cm away from the original position



The main peak energy decreases with the increasing distance between the emitter and the chip. Here it is approximately 4 MeV, 2.5 MeV and 0.5 MeV. When the positioner blocks are about 3 cm away, no alpha particles are detected any more.

One more phenomenon is visible during the histogram comparison. The second peak gradually disappears as the number of overlapping traces of alpha particles decreases.