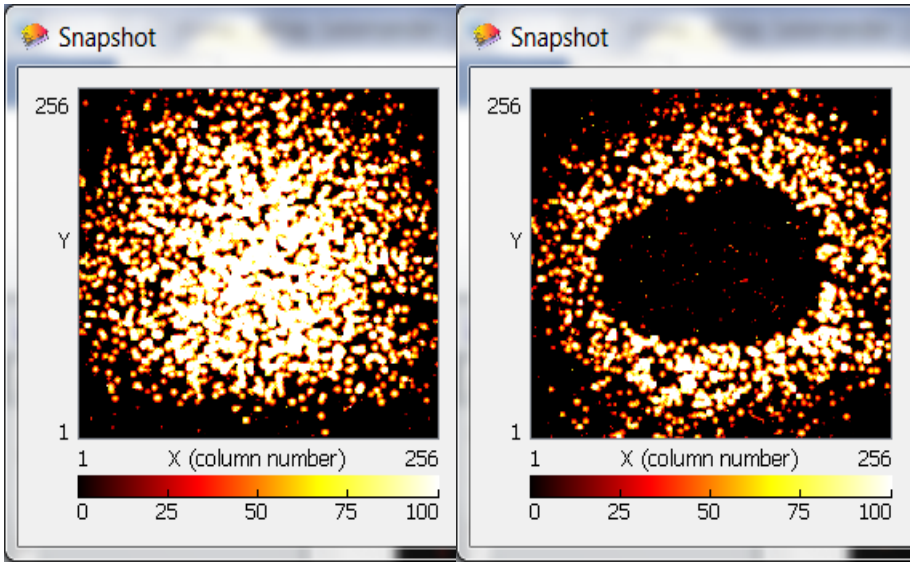
Absorption of Alpha Particles in Water

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

Although clear water is transparent for both gamma photons and photons of visible light, alpha radiation is strongly absorbed in it.

Simple preview: *Mode spectrometer, Exp. Count 500, Exp. Time 0,1 s, Bias 18 V, Analysis type Off, Finite count of steps - checked, Integral mode - checked, Set color map Hot, Min. level 0, Max. level 100*

Procedure: Fix the MX-10 into the adjustable desk and tilt it together with the whole desk so that the detector chip is in a horizontal position. Select the short hole as the particle outlet hole (position 3). Position the emitter so that the distance between the prisms on the desk is between 5 and 7 mm. Lay one layer of food-wrapping film on the detector chip. Take a snapshot and save it using the *Tools* – *Snapshot* function. Move the particle source further away, drop a tiny droplet of water on the film using a dropper or some other aid and move the particle source back to the original position. Save the snapshot again.



The droplet of water is shown as a black spot containing no alpha particle traces in the picture on the right. A layer of water only 45 μm thick is enough to absorb particles emitted by americium. The drop of water has shielded alpha particles.

Gamma photons pass through the droplet of water as the layer of water is not thick enough. However, a layer of water several meters thick can also contribute to shielding gamma radiation, which takes place in nuclear power plants. When they are taken out of the reactor, spent fuel rods are stored in a pool of water which serves for cooling the fuel, shielding the neutron flow and also partial shielding of gamma radiation.