

Home task 1 – Radionuclide properties

We usually associate PET with so called “pure” positron emitters like ^{11}C and ^{18}F . However, no radionuclide is a pure positron emitter since there will always be a component of electron capture, which in ^{18}F is as high as 3%. We need to take this into account when calibrating the PET tomography.

But some positron emitters can also emit gamma radiation. In such cases it is even more important to understand the physics behind. If the gamma is correlated to a positron the PET system has to handle three photons at the same time and the probability to misplace the event increases (scatter).

You can find detailed information about different decays in various data bases e.g.

http://www.nndc.bnl.gov/nudat2/indx_dec.jsp

However, these data tables are very detailed. To understand how the decay affects the PET system we can neglect particles with a low abundance. The task in this home work is to look at ^{76}Br and to make a simplified decay scheme that just takes into account radiation with an abundance of larger than 5%. Compare this decay scheme with that of ^{18}F .