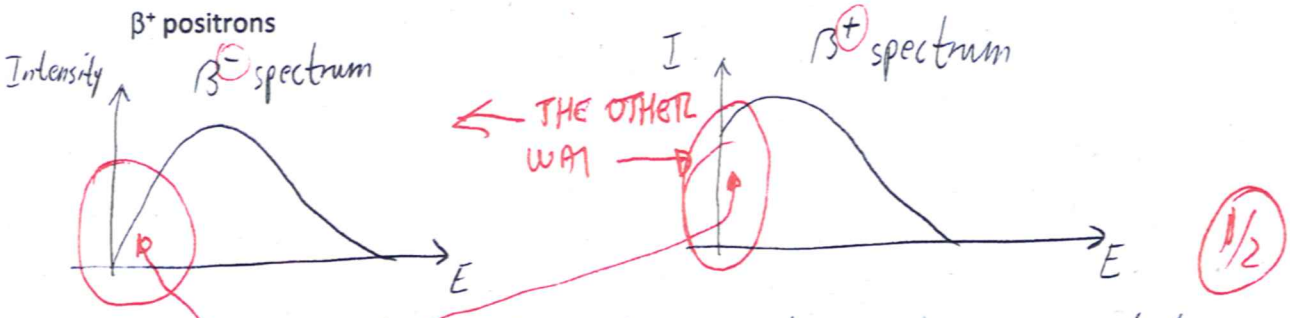
FNE-RP. Decay processes. Questionnaire

2014 10 06

Name: _____ Group: 1

Draw, schematically, the energy spectrum of e^- and e^+ in β^- and β^+ processes. Give a short explanation of the different in the shape of the energy spectrum of the β^- electrons and β^+ positrons



1/2

Electrons are attracted to the positive nucleus, and so more electrons emerge with low kinetic energy after a β^- decay.
Positrons are repelled and gain kinetic energy as they are emitted from the nucleus.
Naturally, the effect vanishes when the emitted particle leaves the atom, as the orbit electrons make the atom neutral. Thus, it is a fairly short acceleration or de-acceleration the particle experiences.

Why there are almost not β^+ emitters on a nuclear reactor?

Almost all nuclei in a reactor are neutron-rich, and therefore decay by β^- decay rather than β^+. In particularly the fission products are very neutron-rich (because the heavier nuclei that splits has a higher neutron-to-proton ratio than ~~the~~ stable lighter nuclei), but also heavy nuclei that undergoes neutron capture.

OK

What kind of nuclei present alpha decay? Give a short, intuitive, explanation to this fact

Heavy nuclei ($A > 150$) are the most common alpha decayers. This because the large amount of protons repel each other in the nucleus, making it more unstable and more likely to decay by emitting an alpha particle.

OK

* VERY HEAVY ⇒ FASTER IF EMMITTING A "PART" OF THE NUCLEUS.