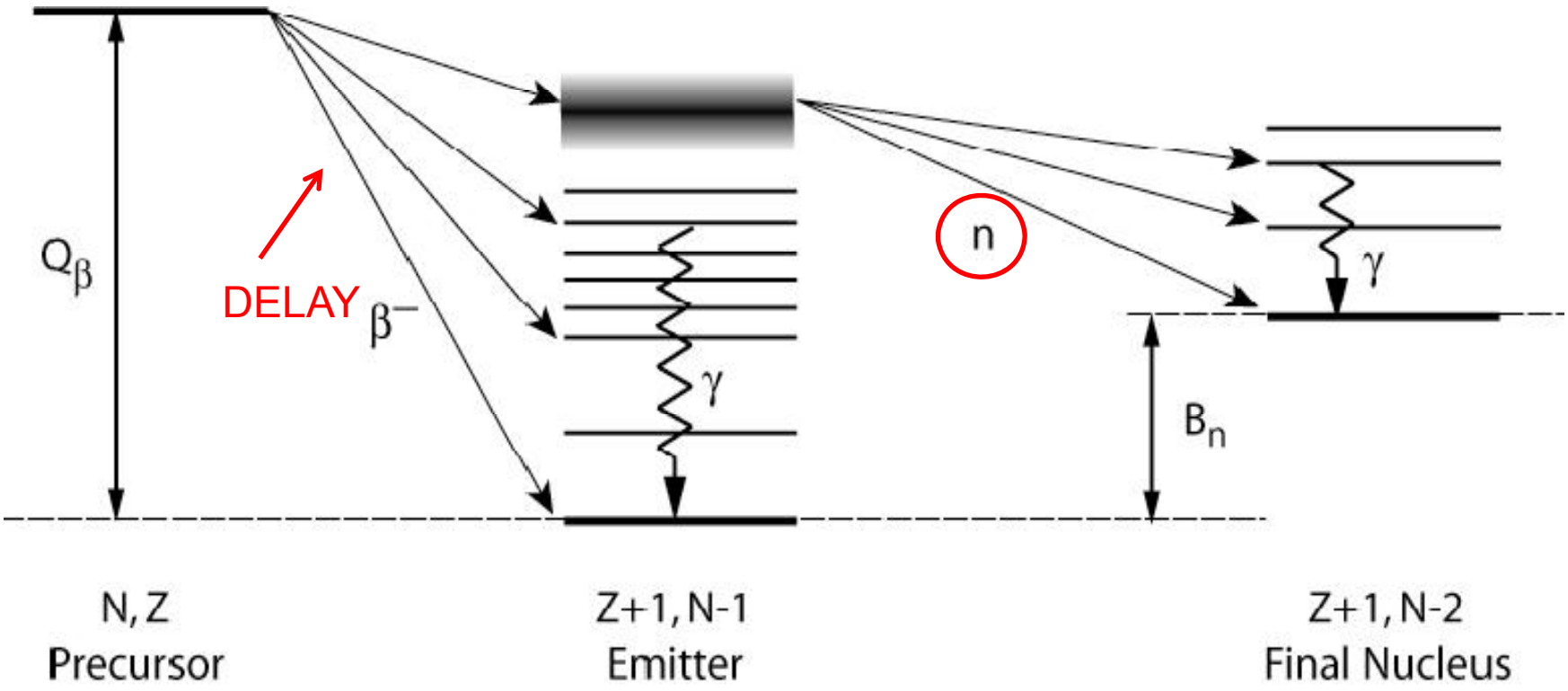
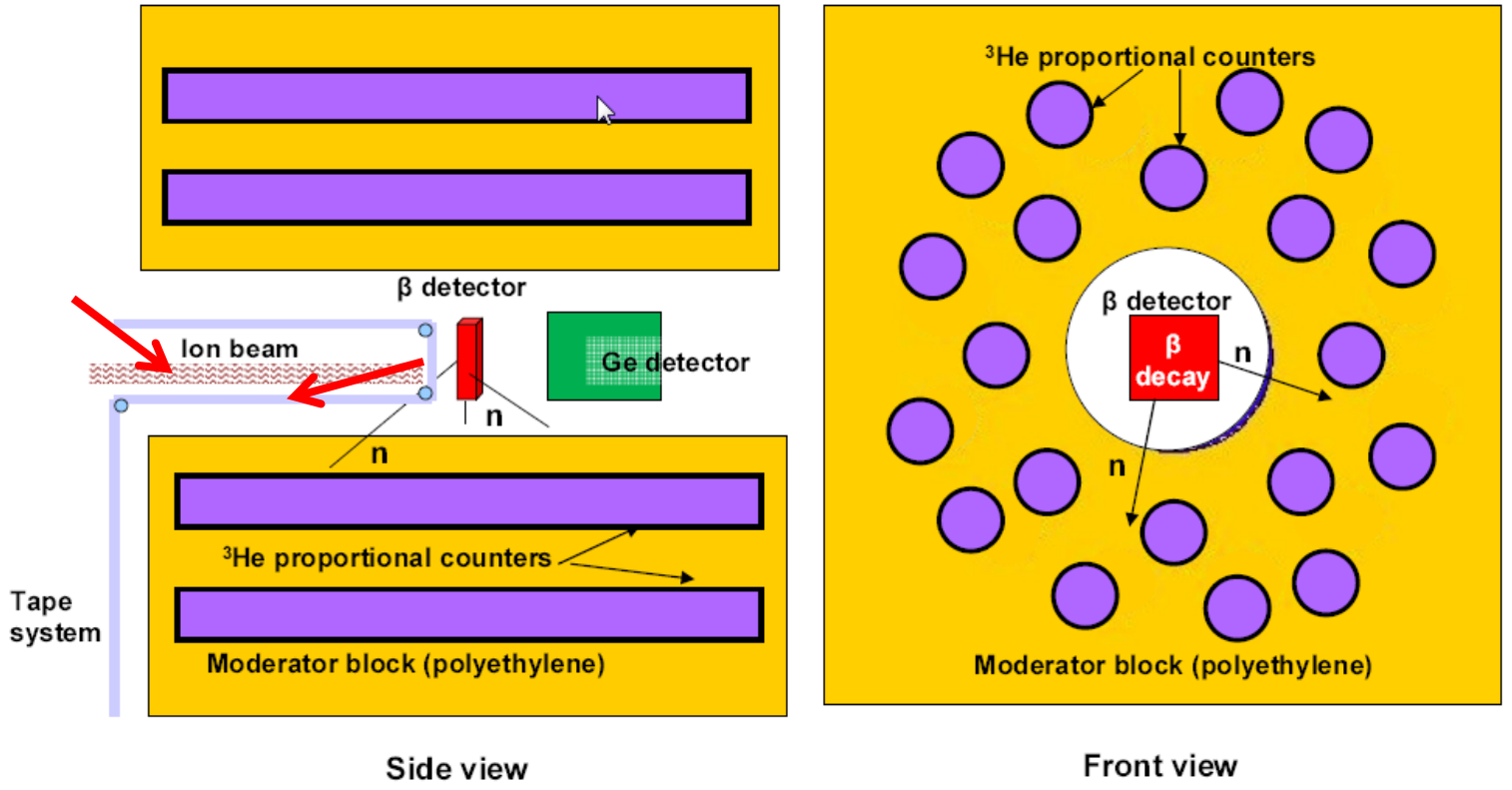
β^- delayed neutron detector

Main objective: To measure neutron emission probabilities after beta decay of neutron rich isotopes with relevance in basic nuclear physics and nuclear technology.



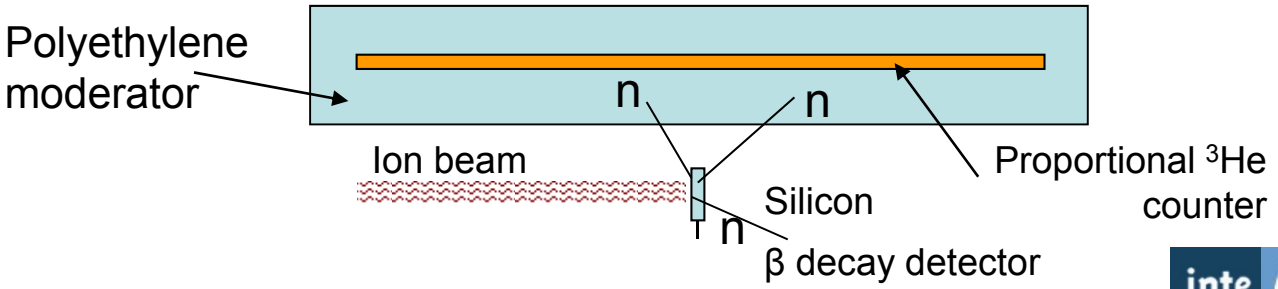
For this purpose a neutron detector has been designed. This detector consists of a polyethylene array with 20 ^{3}He counters around the beam hole.

Pure beam of ions of the nucleus of interest from IGISOL+ JYFLTRAP Implanted on a tape (in front of a Si detector)

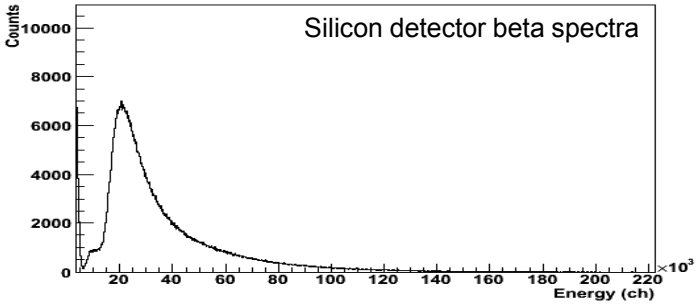


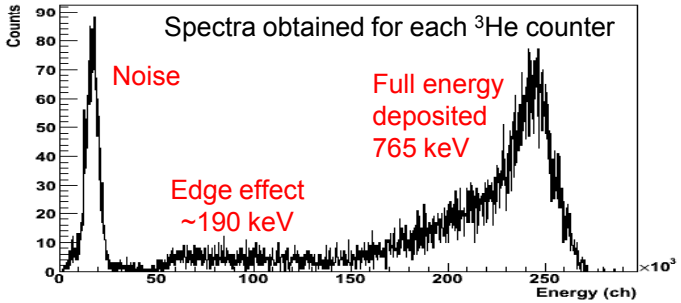
Indirect reaction to detect neutrons with 3He counters

$$^{3}He + n \rightarrow {}^{3}H + {}^{1}H + 765\ keV$$

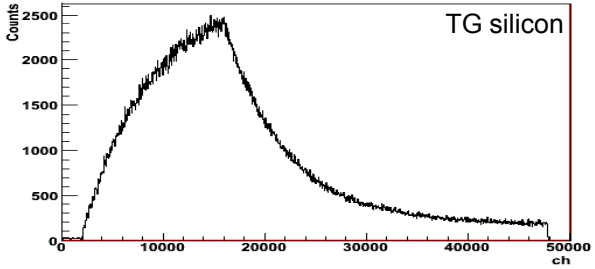


Silicon and ^{3}He spectra obtained

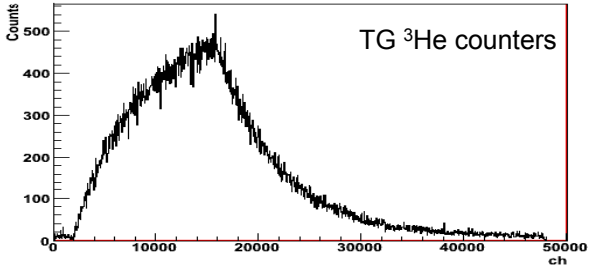




Growth (implant) and decay curves constructed

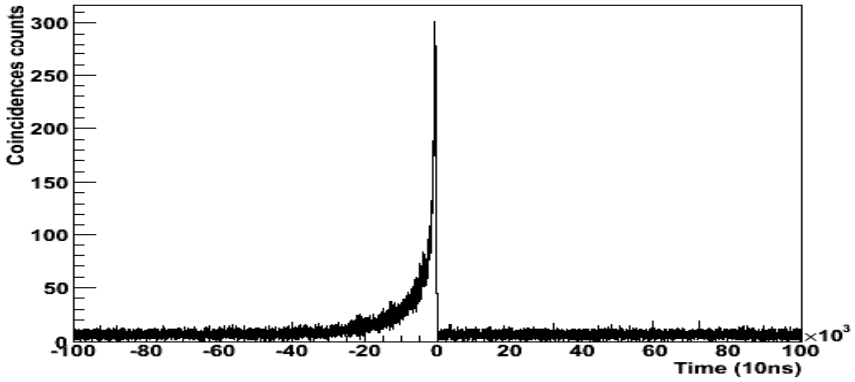


Implant for 3 $T_{1/2}$ and left decay for 7 $T_{1/2}$ before moving the tape



In the analysis, these curves will be fitted to the Bateman equations.

Plot showing the neutrons in coincidence with the beta decay within a 1ms window from the beta detection.



The neutron emission probability is calculated from:

$$P_n = \frac{1}{\varepsilon_n} \frac{N_{n\beta}}{N_\beta}$$