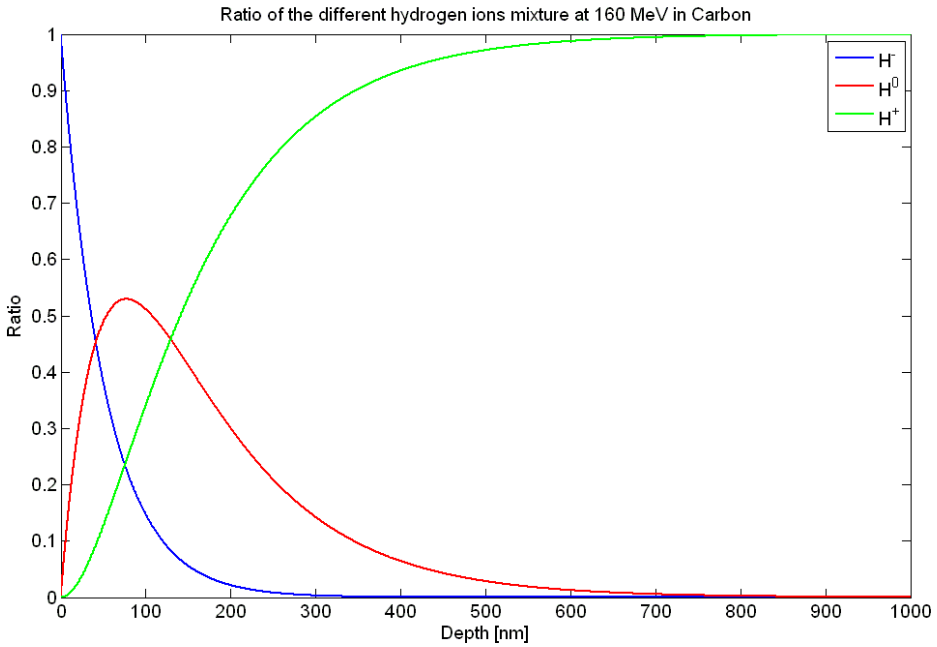
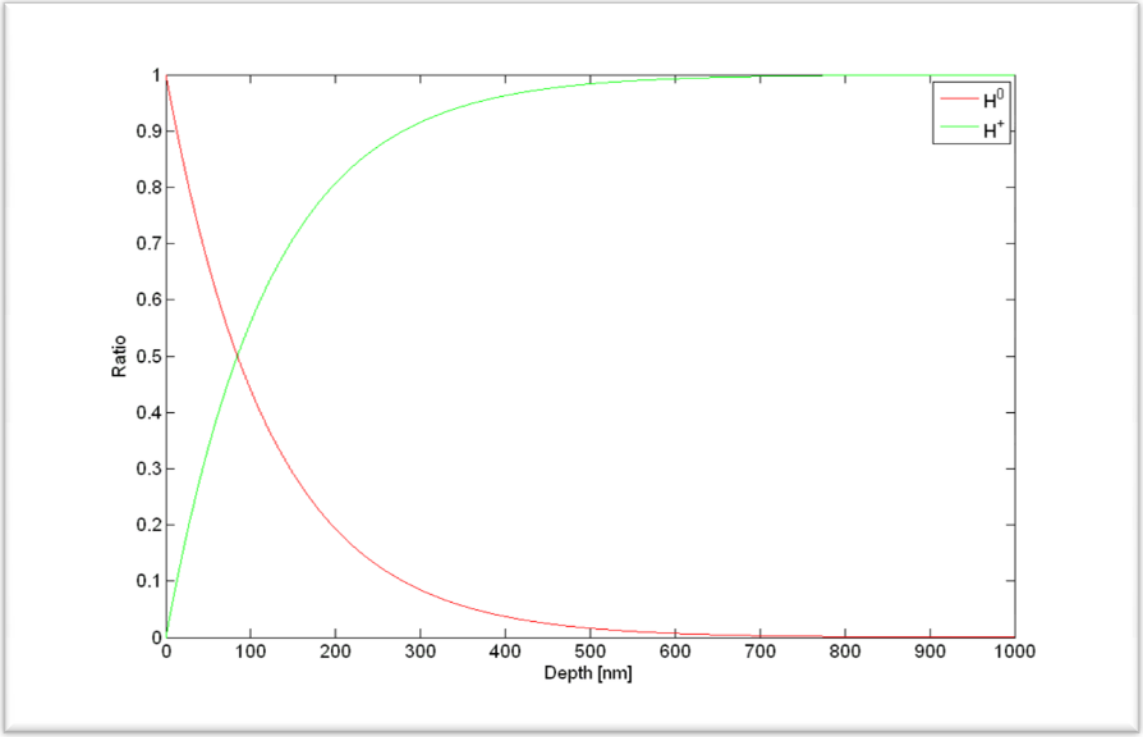
Beam current measurement at the PSB injection.

Stripping foil

At 160 Mev, the H^- ions will be stripped in the first micrometer of carbon, the H^0 ions also,





The energy of the electrons from the stripping of H- ions is 87 keV, their range is about 22 μm in Titanium and about 55 μm in Carbon. For current measurement, the foil thickness needs to be at least 2 times greater that the range of the electrons inside the material so the different ions species can be considered totally stripped inside the foil. (In a carbon foil for a H^0 bean the proportion of hydrogen atom is 5e-36 after 10 μm).

In a thin titanium foil (50 m), the energy loss by a 160 MeV proton is about 83 keV, and the dE/dx will not change. The SEY depends on the stopping power of the particles, for the H^- beam measurement the SEY of H^- entering the foil is the same as the SEY of the proton exiting the wire.

Secondary emission happens when a charged particles passes thought an interface between vacuum and solid matter, for the H^0 beam measurement, the particles entering the foil doesn't generated SE. SE will be only generated by proton exiting the foil with the same yield.

The SEY for Titanium is about 0.025-0.038 electron per proton (or H^-). For the foil used for H^- current measurement the charge creation is around -1.93 per particle, for the other foil the charge creation is around -0.96.

Material	Carbon	Titanium	Copper
SEY [%]	1.4-1.8	2.5-3.8	3.3-6.3
charge H^0	-0.982	-0.962	-0.937
charge H^-	-1.964	-1.924	-1.874
Conductivity	0.00061 10^6	0.0234 10^6	0.596 10^6
range electron [µm]	52	22	13

A polarization could avoid SE from the foil, a positive bias can be applied to the foil, in this case, the charge creation will be -2 for the H^- current monitor an -1 for the H^0 current monitor.

This current monitor could be tested in the 3 MeV test bench at 12 MeV. At 12 MeV the stopping power in a 50 µm titanium foil is almost constant and the SEY is 0.178. The dump can be simulated by a 100 µm carbon foil.