Calculate Radated XS with E08014 long targets

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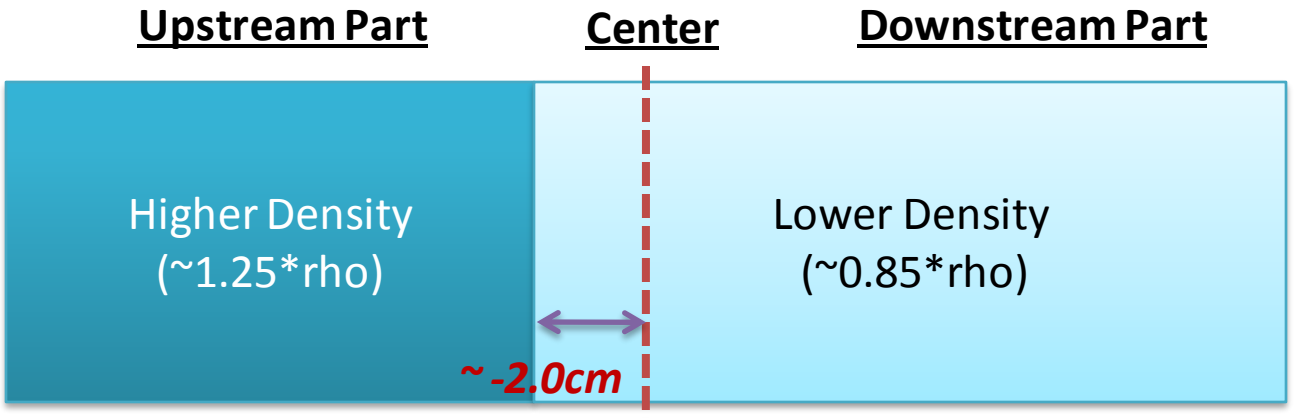
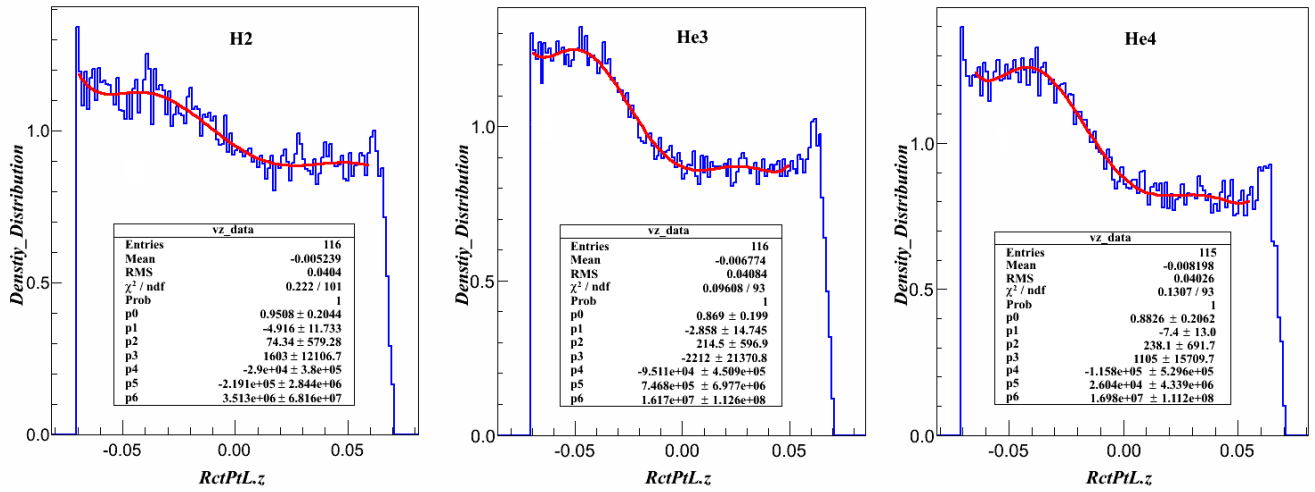
1, General Problem:





1, When calculating Radiated XS:

We need parameters like TR, bt and btb from following parts of target system:

a) Front Window – Alumi Wall
b) Target – including two parts for long targets
c) Back Window – Alumi Wall
d) Maybe: Air between target chamber and entrance of Q1, shield of Q1 entrance, shield of Q3 Exit, shield of VDCs, etc

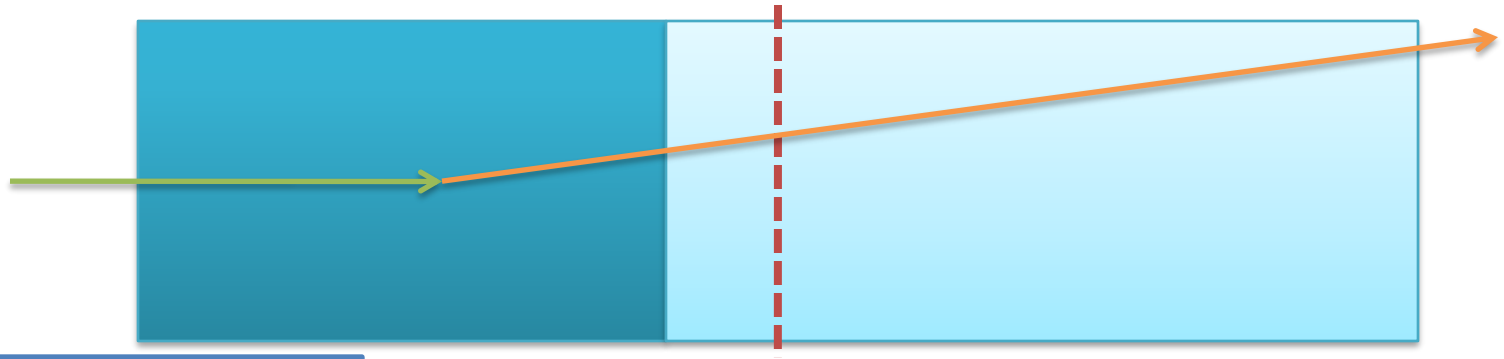
We include the a), b) and c) when doing radiation tail calculations.
All are for Eloss of Ep.

$$TR\_I = Win\_I\_TR + Target\_TR/2, bt\_I = Win\_I\_bt + Target\_bt/2$$
$$TR\_F = Win\_F\_TR + Target\_TR/2, bt\_F = Win\_F\_bt + Target\_bt/2$$

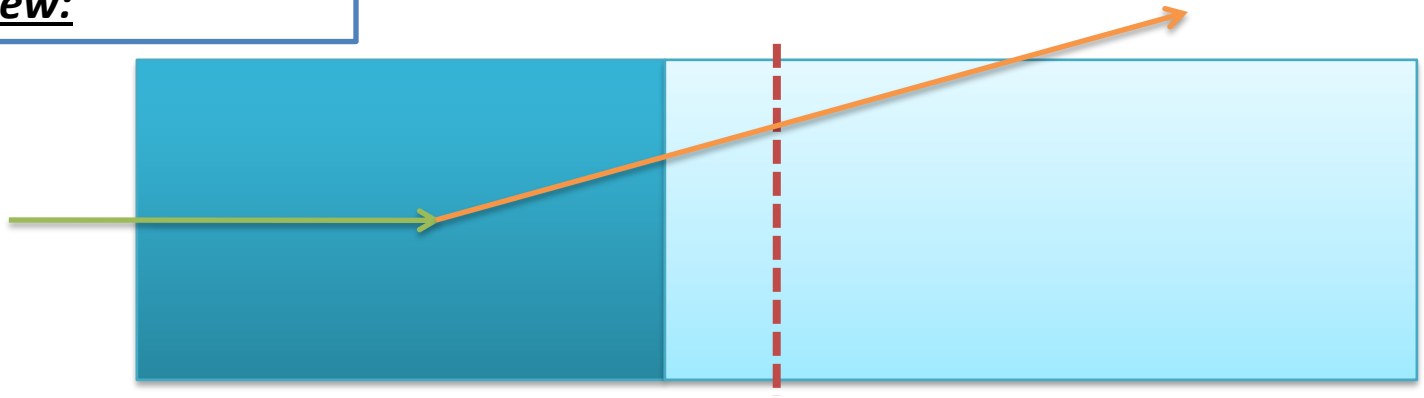
We do special treatment for b).

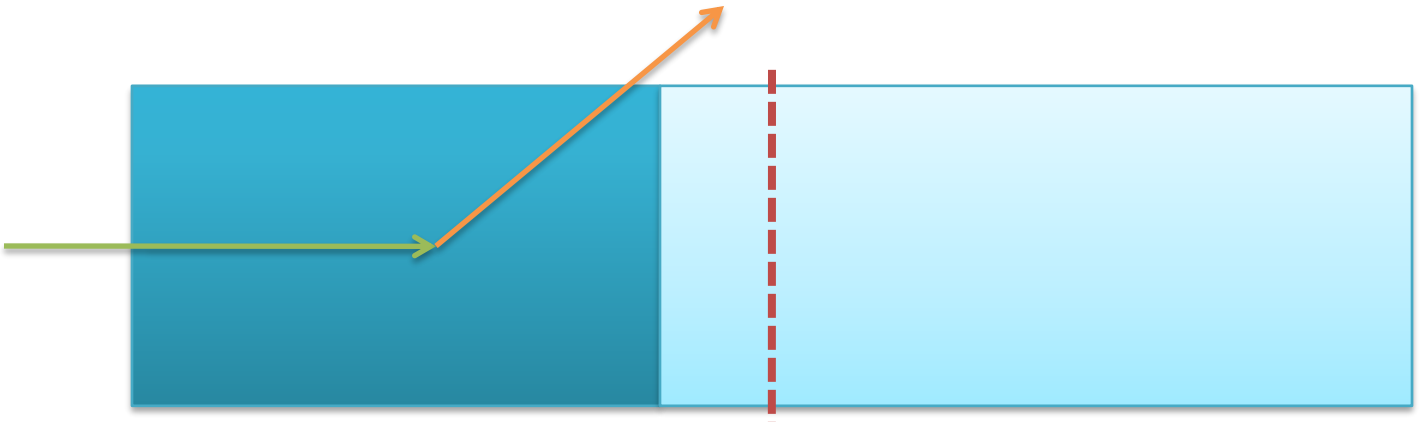
$$TR\_I = Win\_I\_TR + Target\_Up\_TR, bt\_I = Win\_I\_bt + Target\_Up\_bt$$
$$TR\_F = Win\_F\_TR + Target\_Down\_TR, bt\_F = Win\_F\_bt + Target\_Down\_bt$$

3, Different Cases → 1,2,3

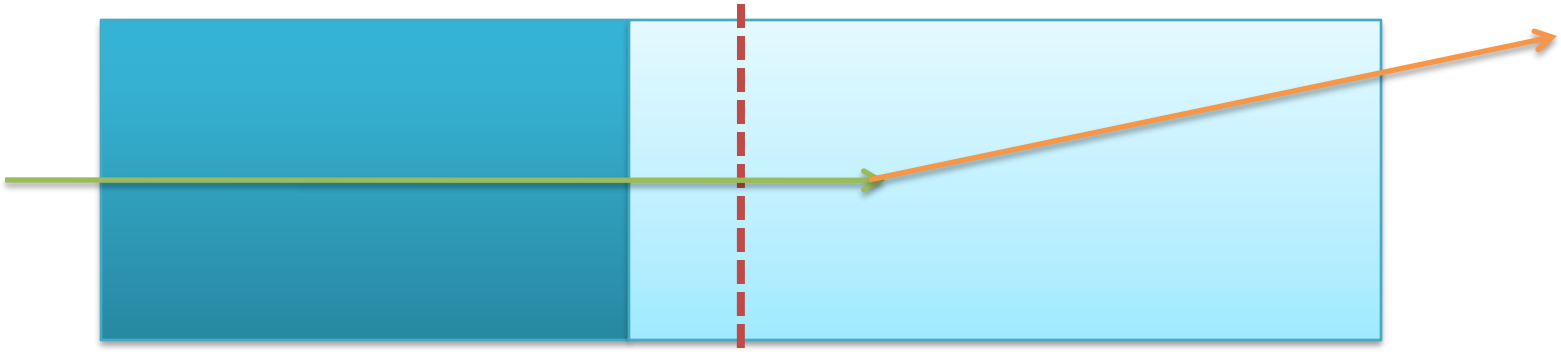


Top View:

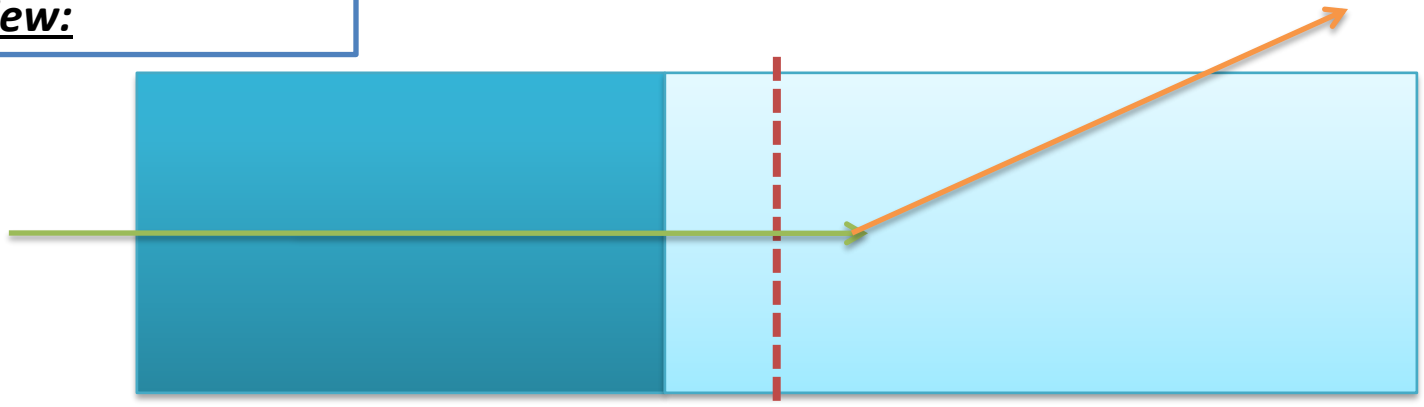


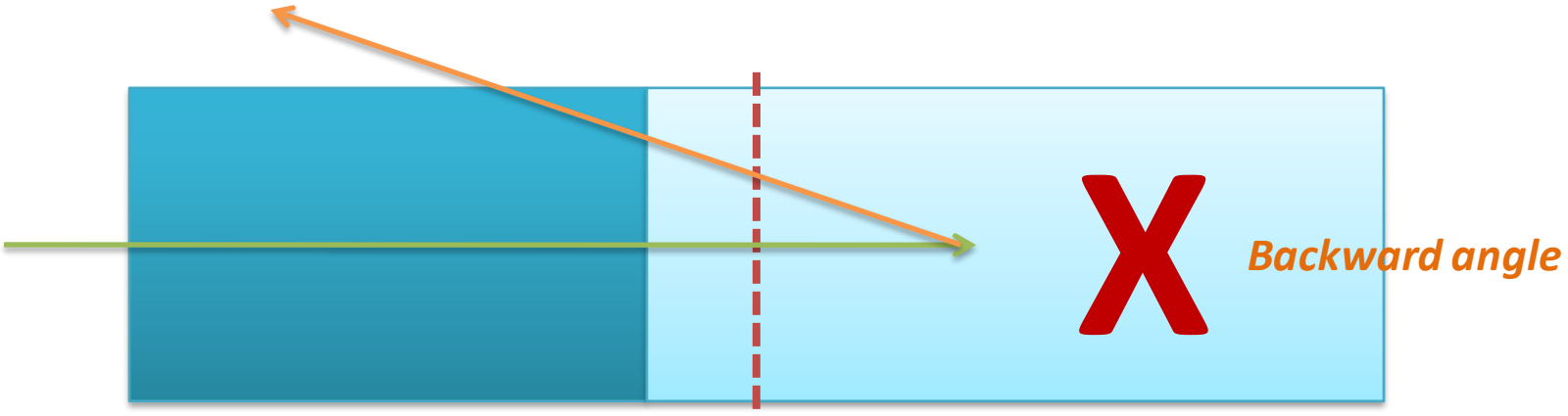


3, Different Cases → 4,5



Top View:





4, General Idea

When running Monte Carlo, we have different locations of reaction points. However, when we calculate XS as a function of Xbj or Ep, we average over the entire target vertex. So we need an overall radiation effect for this type of targets while ignoring the Y_tg distribution. Here is how I deal with this problem.

1, To calculate one XS point for a long target, like one fix Xbj value for He3, we actually calculate XSs at 10 different locations of He3, for example, I uniformly divide the target into 10 pieces.

2,We evaluate TR, bt and btb at different locations along the target, calculate the Eloss, as well as radiated XS at this radiation length.

3, We can either simply average these ten XS values to get the final value, or we can consider the true that downstream part has more reactions due to the cross section and acceptance effect, and apply different weighting factors on XSs at different locations.

5, Test Results:

He3, Theta = 21 Deg, Ep = 2.884 GeV/c