2C extraction vs. foil width

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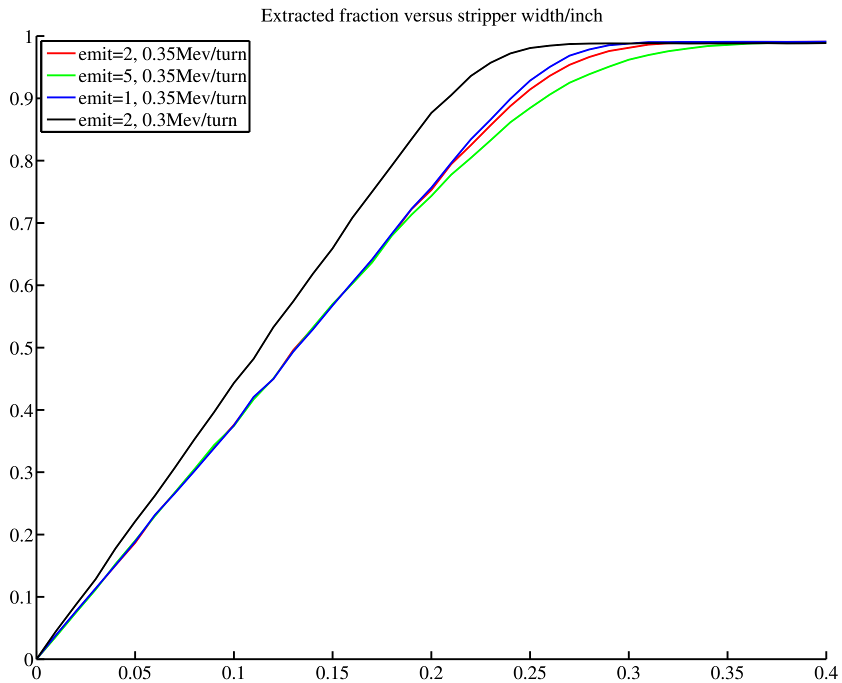
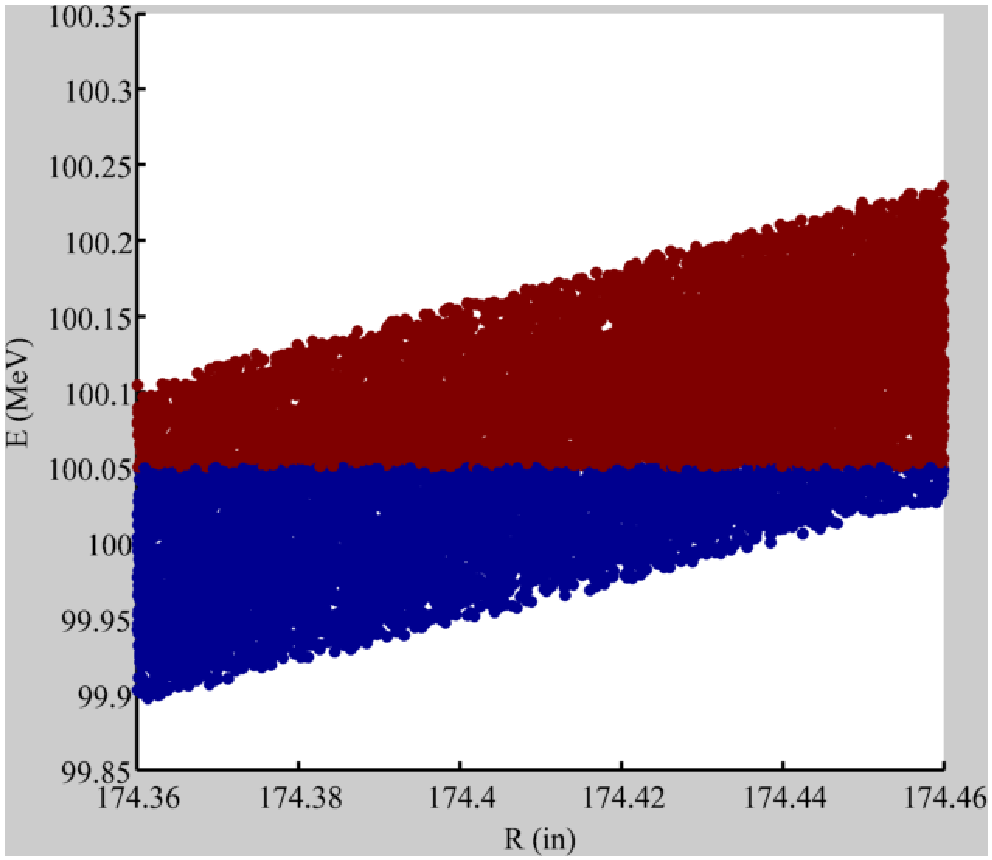


This is extracted fraction versus foil width/inch. The Blue, Red, Green are resp. $1, 2, 5\,\mu$m emittance, which shows that the high amplitude particles can miss the foil. The black curve is for energy gain per turn of 0.3 MeV and all the rest are for 0.35 MeV.

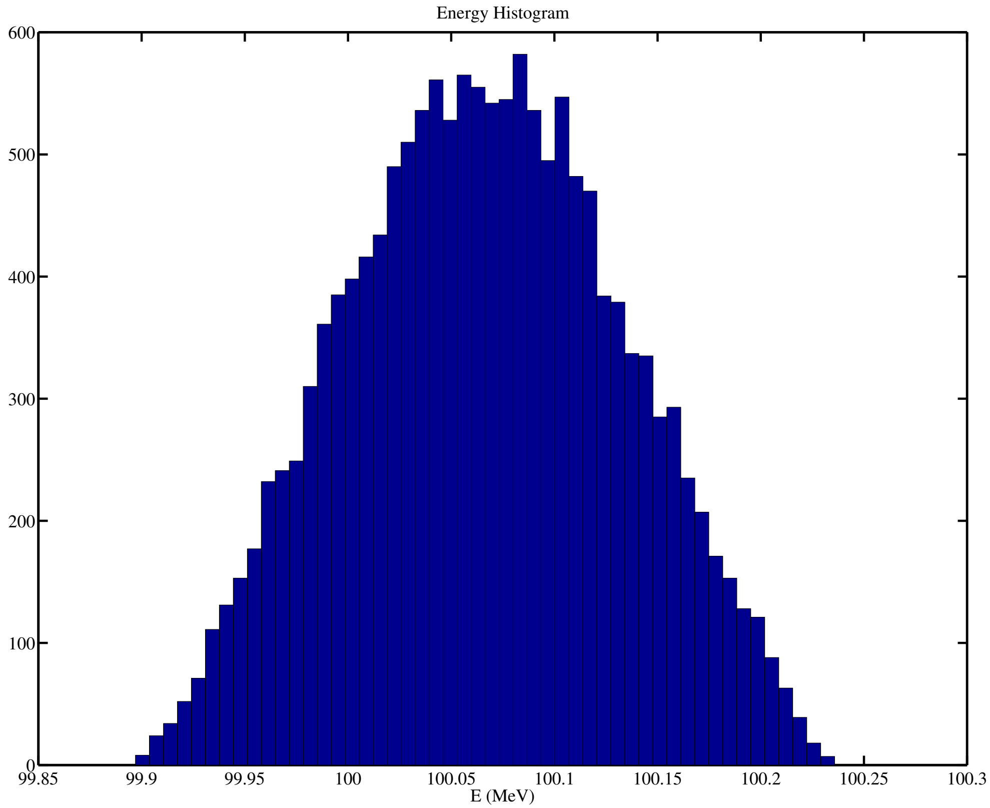
This shows that over a large range, the extracted fraction is insensitive to emittance, and that it is linear with foil width. In fact the result is easy to describe and understand: the extracted fraction in this range is simply the ratio of foil width to radius gain per turn. For 0.35 MeV per turn, the radius gain per turn is 0.262 inch. Therefore to get 38%, the foil width is 0.38×0.262 inch, or 0.10 inch.

For the particular case of $\epsilon_x = 1\,\mu$m, 0.35 Mev per turn, foil width of 0.1 inch.

Below is the scatter plot of simulated particles. The color is the turn number.

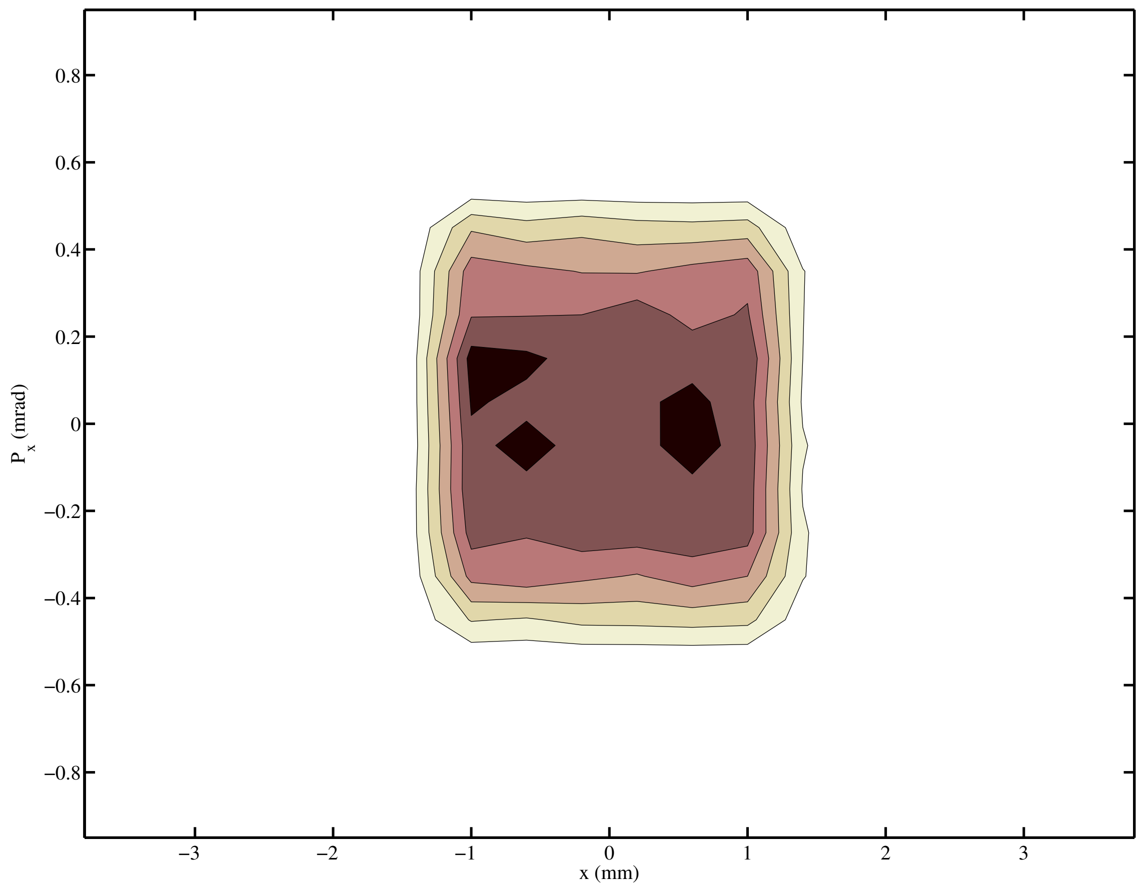


The energy histogram:



RMS energy spread is 0.065 MeV.

The x-P_x extracted phase space in mm and mrad:



The extracted 4 times rms emittance is $0.73\,\mu$m, though the circulating is $1.00\,\mu$m.