

HF0F0 Project Updates

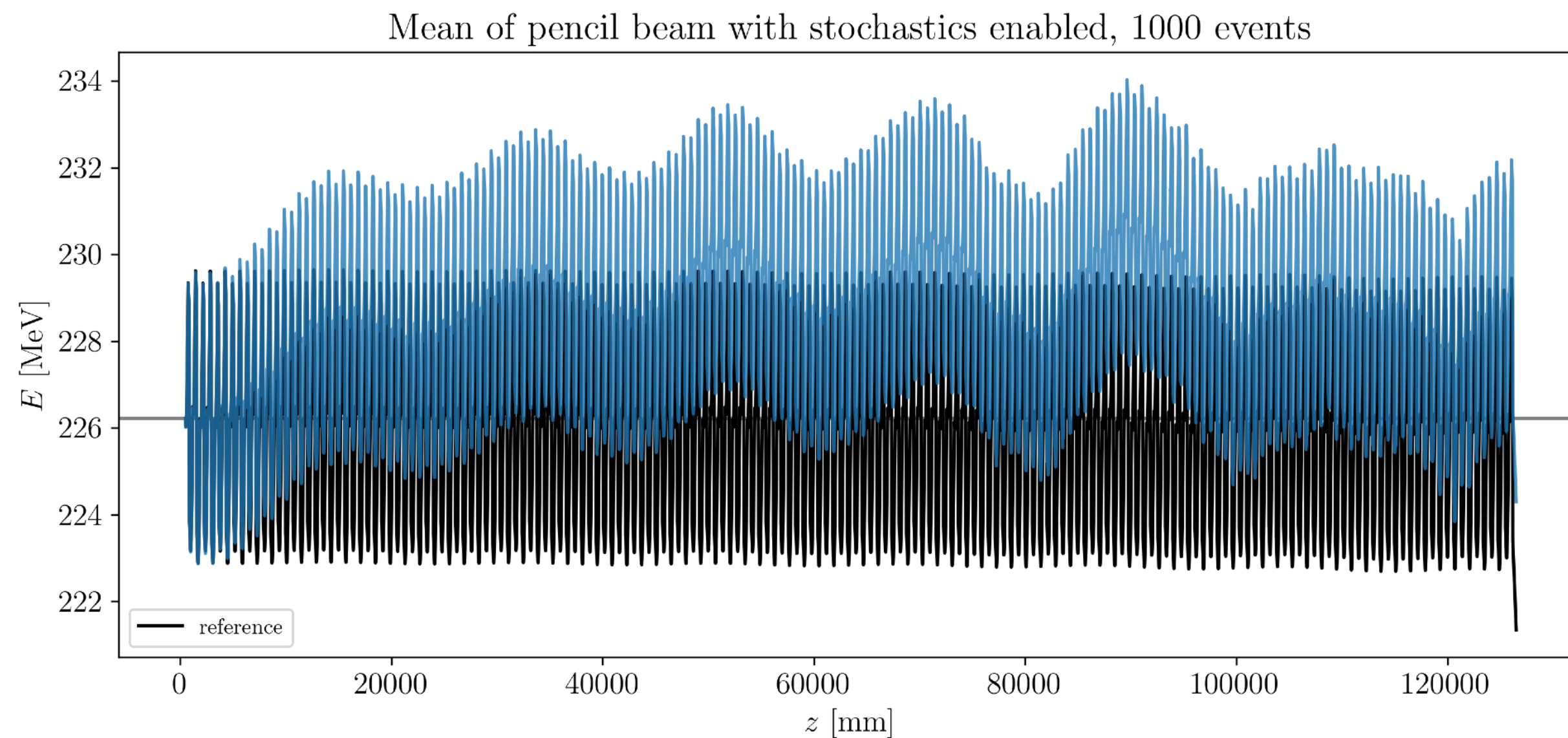
September 25, 2026

<https://github.com/criggall/muon-cooling/tree/main>

Recap from last week

2

Question I am currently trying to answer:
What is the acceptance of the periodic lattice, and how does that compare to the beam dynamics with stochastics enabled?



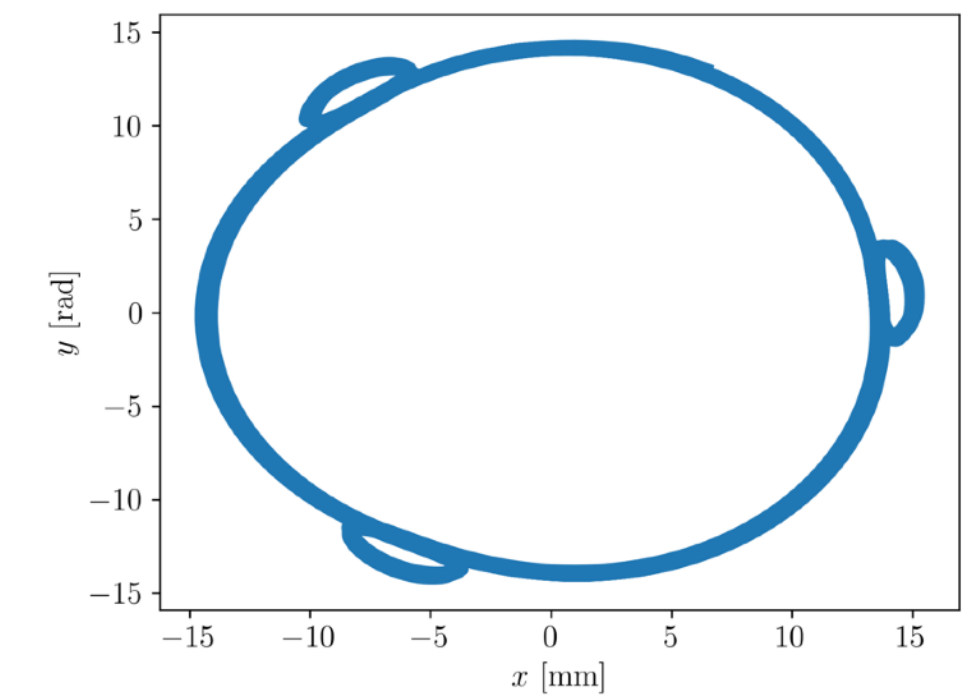
Next steps I laid out last week:

- Find eigenvalues, one-turn transfer matrix, ...? $\rightarrow$ analytic description of stability of closed orbit
- Analytically calculate bucket height
- Make some plots of longitudinal phase space, timing vs. z , etc.
- Send through large distribution and iterate $\rightarrow$ find “matched” phase space distribution / energy for the channel

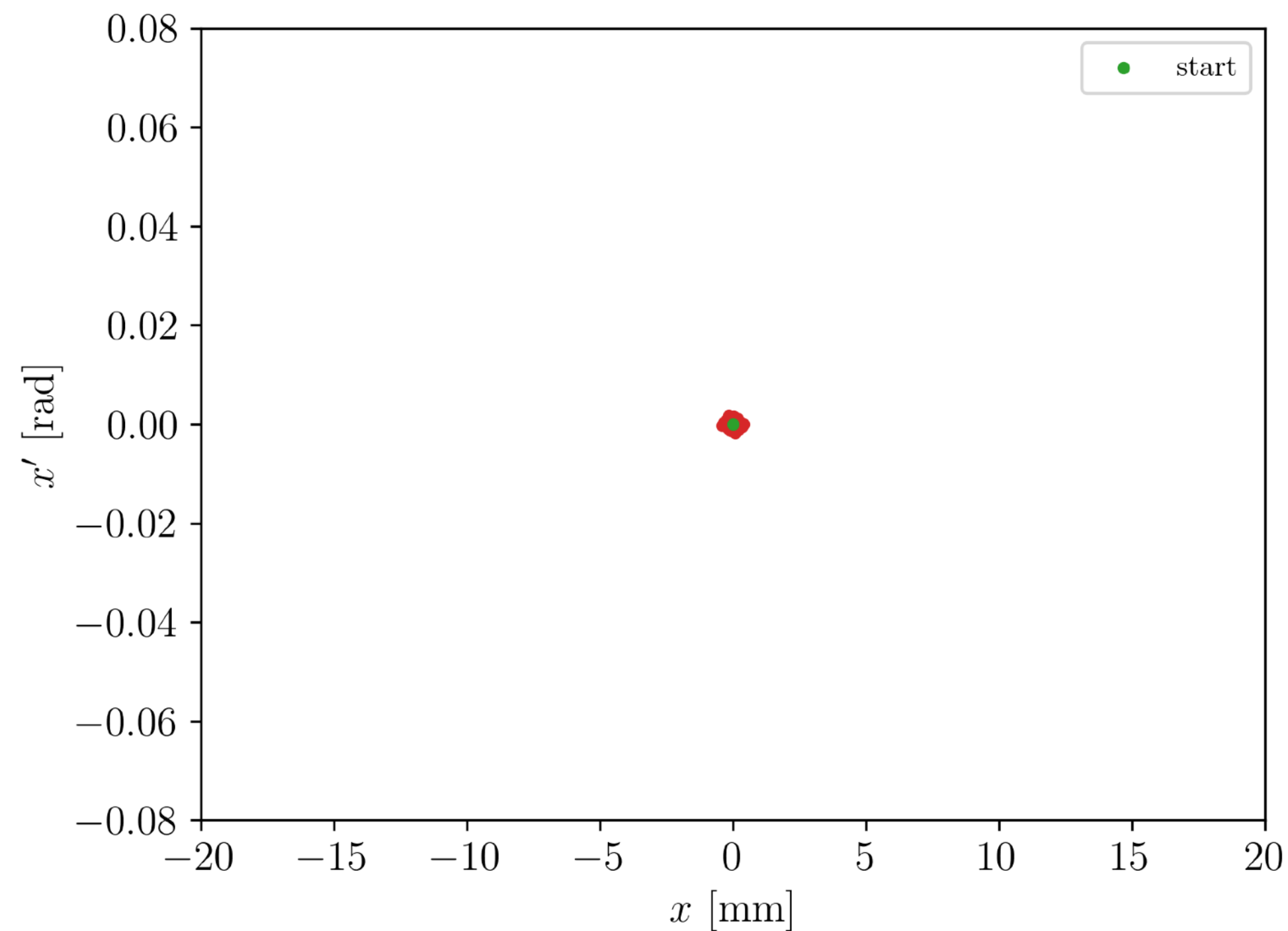
Recap from last week – corrected plots

3

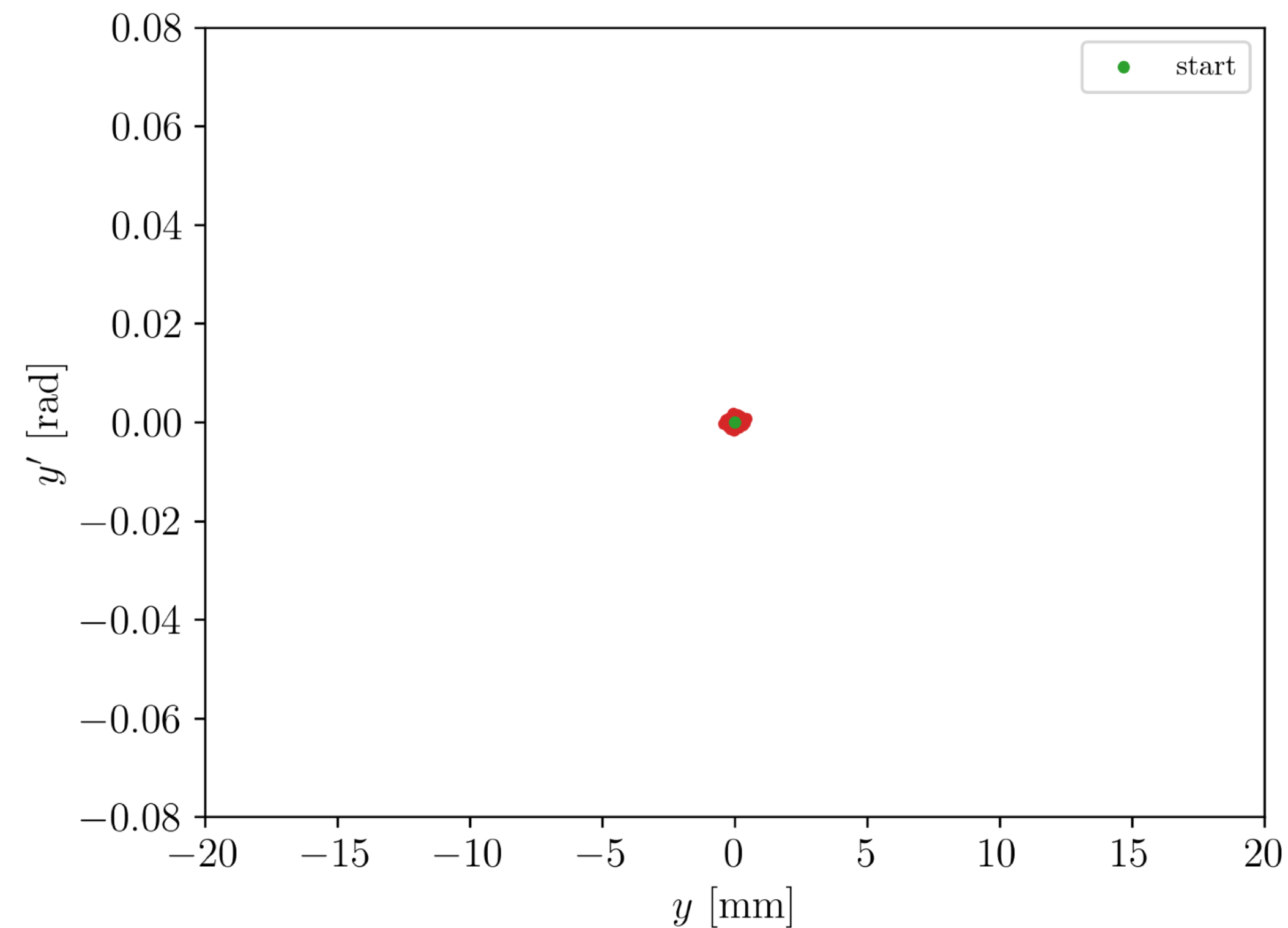
Now let us pick a few cases to study and make some Poincaré maps:



EventID=8



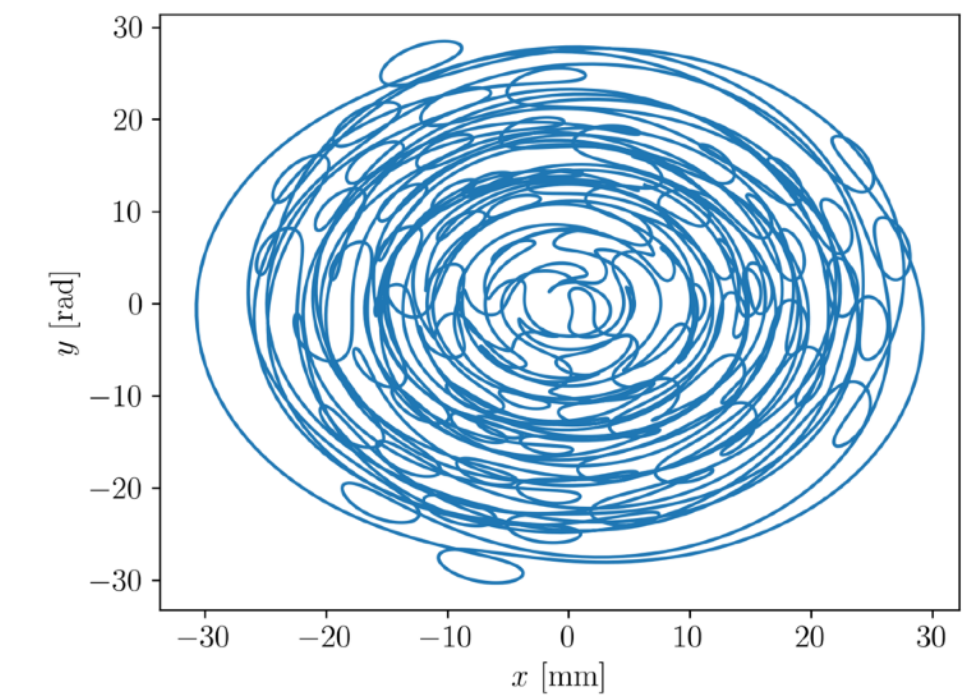
(w.r.t reference)



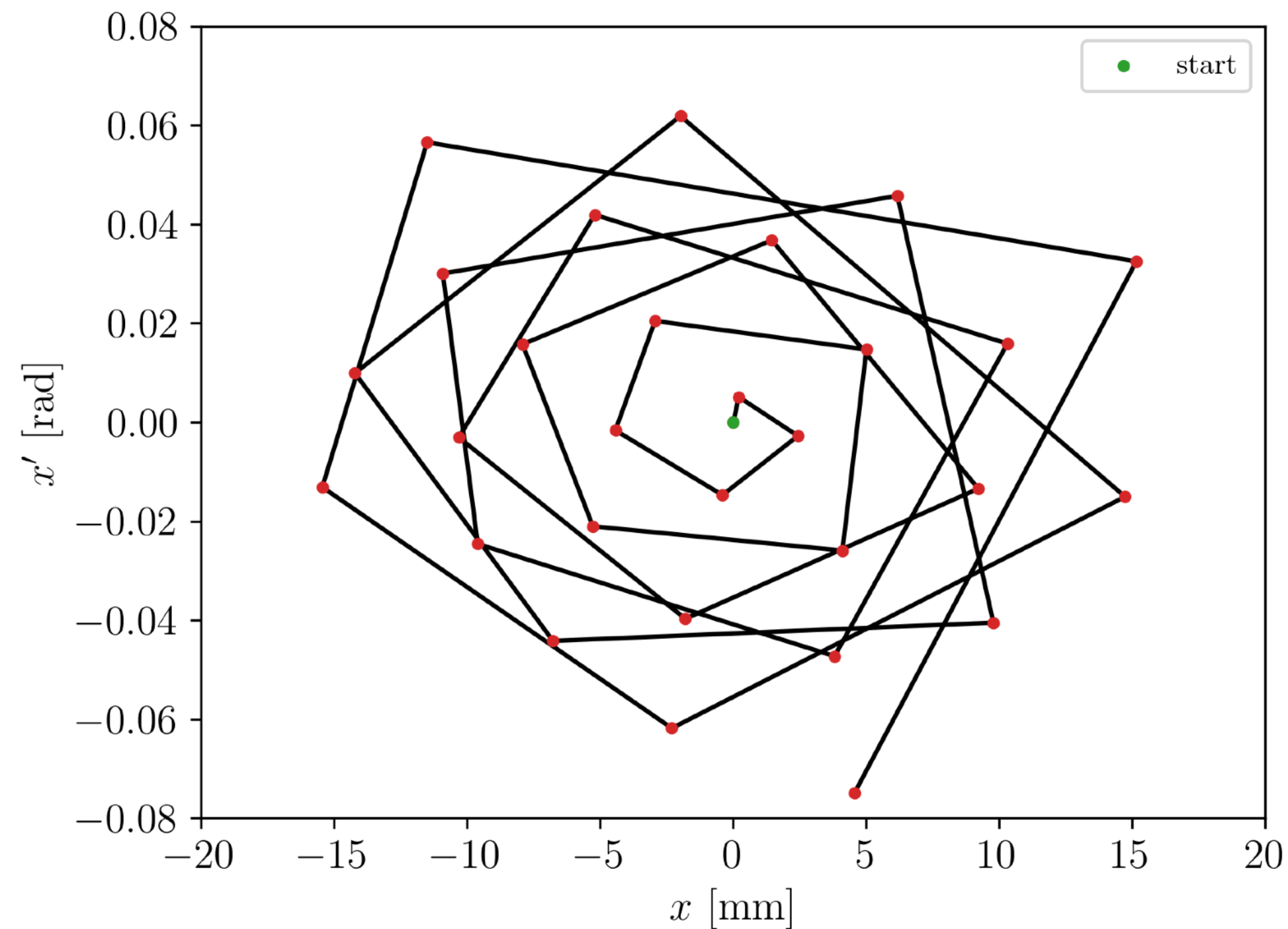
Recap from last week – corrected plots

4

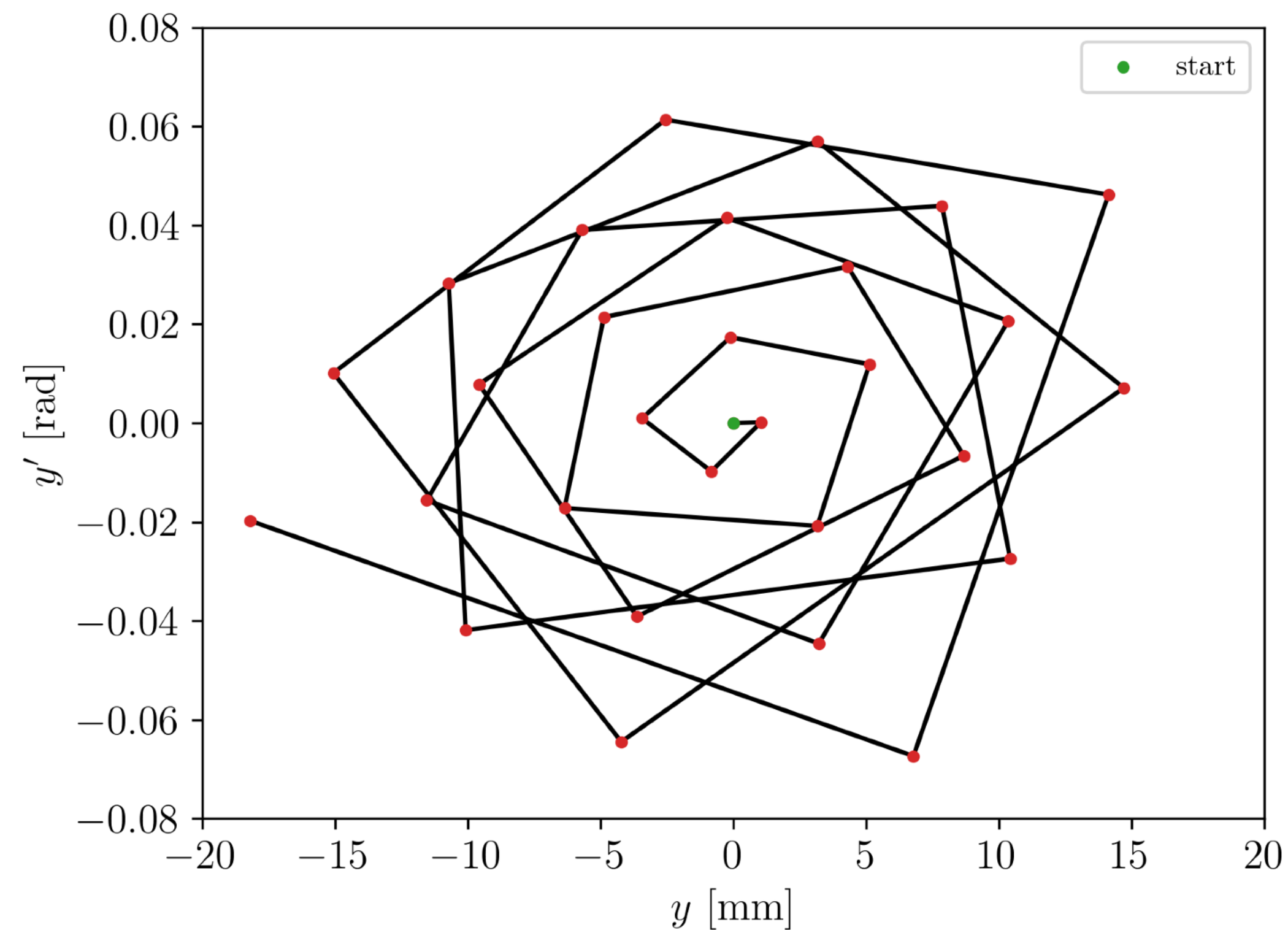
Now let us pick a few cases to study and make some Poincaré maps:



EventID=1



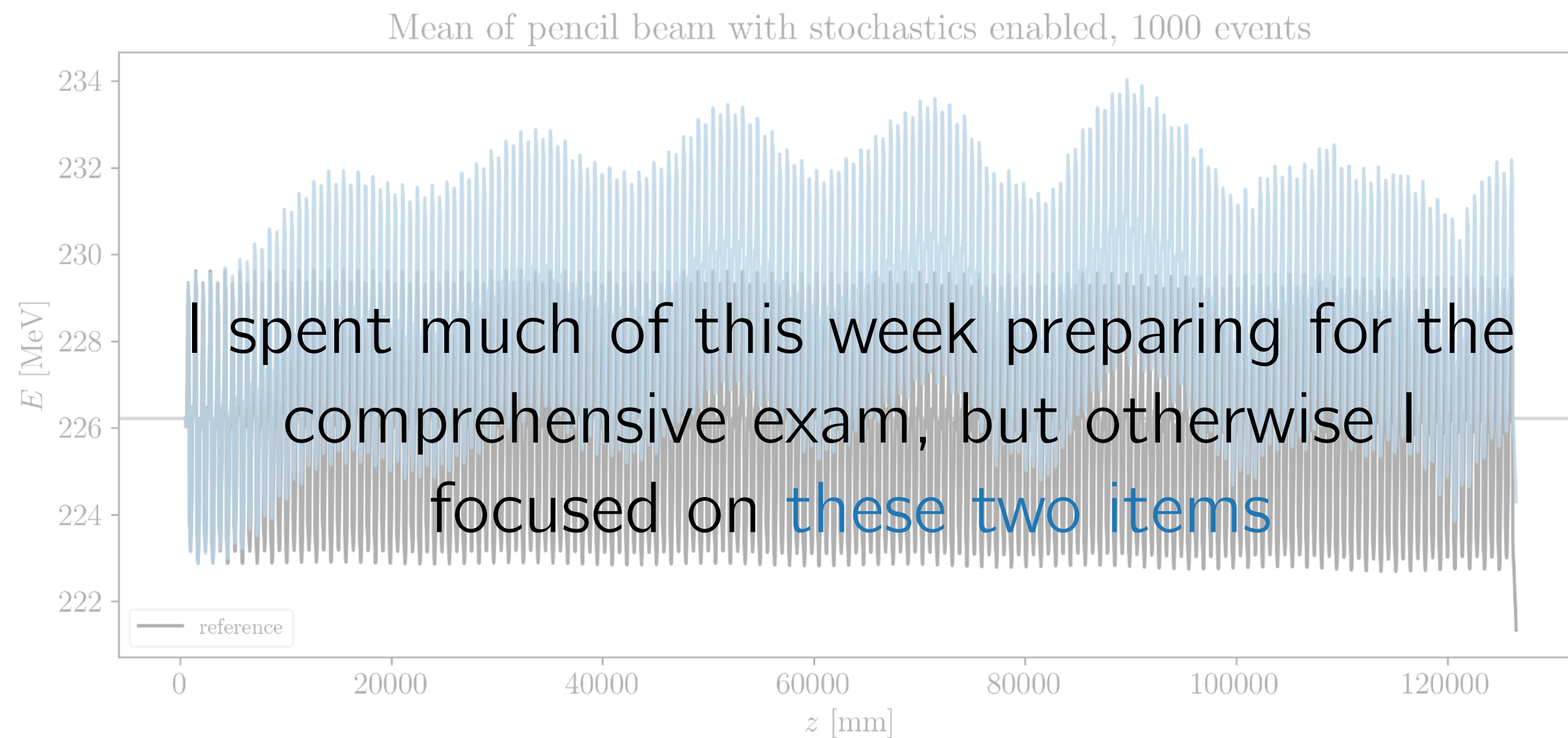
*n.b. does not converge as I
would have expected*



This week's progress

5

Question I am currently trying to answer:
What is the acceptance of the periodic lattice, and how does that compare to the beam dynamics with stochastics enabled?



Next steps I laid out last week:

- Find eigenvalues, one-turn transfer matrix, ...? —> analytic description of stability of closed orbit
- Analytically calculate bucket height
- Make some plots of longitudinal phase space, timing vs. z , etc.
- Send through large distribution and iterate —> find “matched” phase space distribution / energy for the channel

Studying longitudinal dynamics

Continuing with the $\sigma_P = 5$ MeV, stochastics off simulation as a case study:

