The mystery of FLUKA

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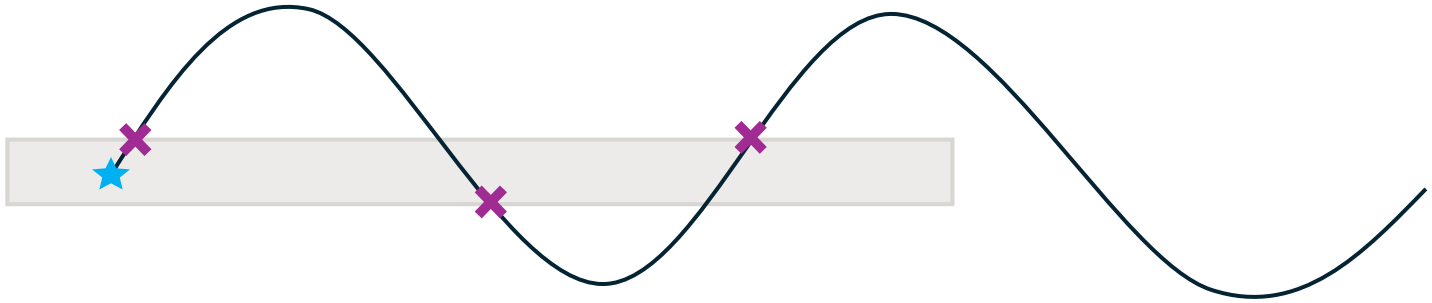
How I’ve been detecting particles so far…

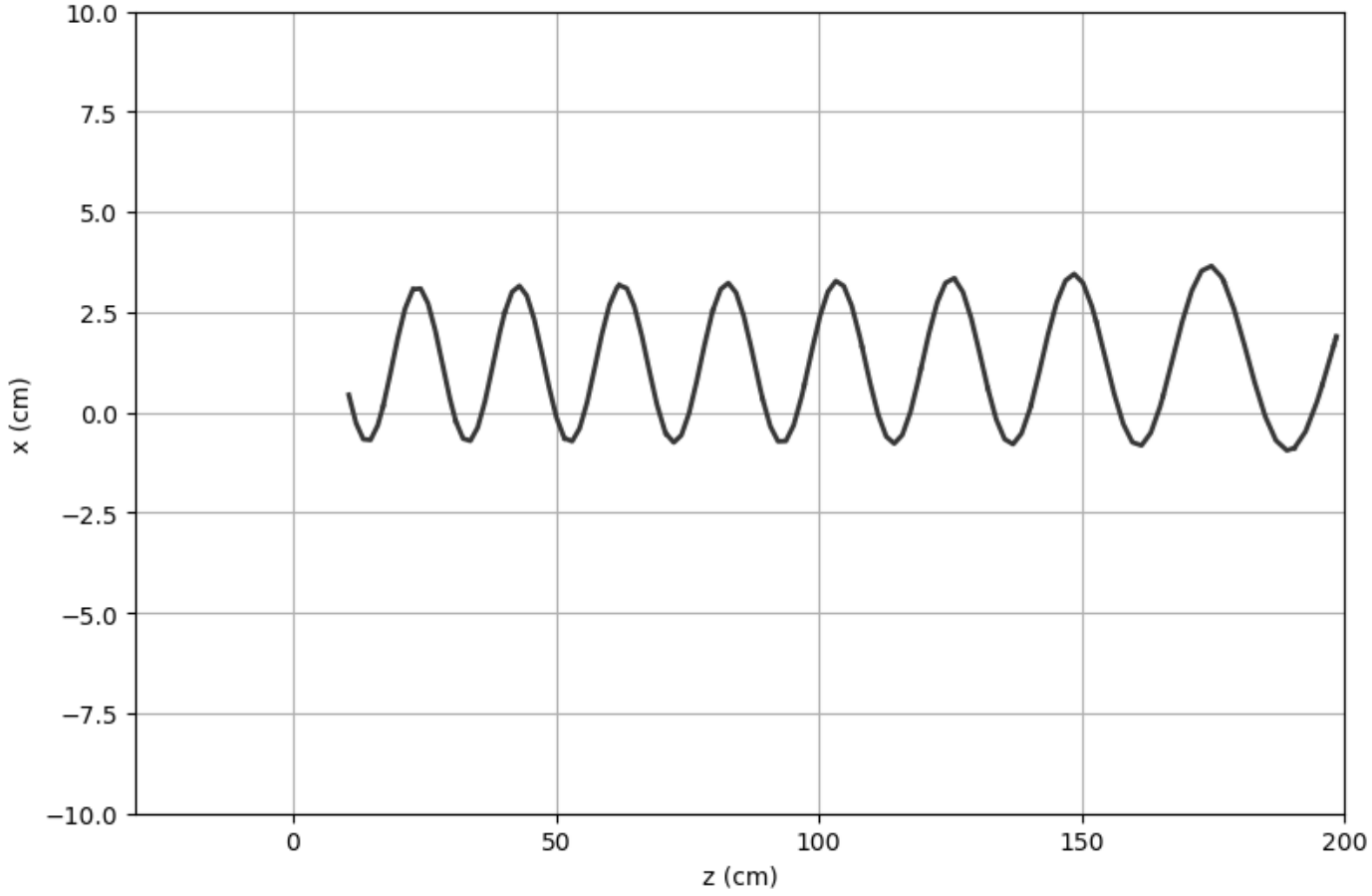
- I’ve been detecting particles when they cross a boundary. Here, I only need to define the region that the particle moves from and the region it moves into.
- For example, in the following schematic, where a pion is produced at the blue cross, it will be detected when it moves from the “target” region to the “beamline” region.
- As you can see, this is problematic as the same particle ends up detected multiple times in different locations at different times → It is difficult to trace duplicates without a “particle ID”



- In this case I would assume that the point of production of the particle is simply the point it exited the target the first time. This has been a good enough approximation.

So… maybe we should get particle trajectories

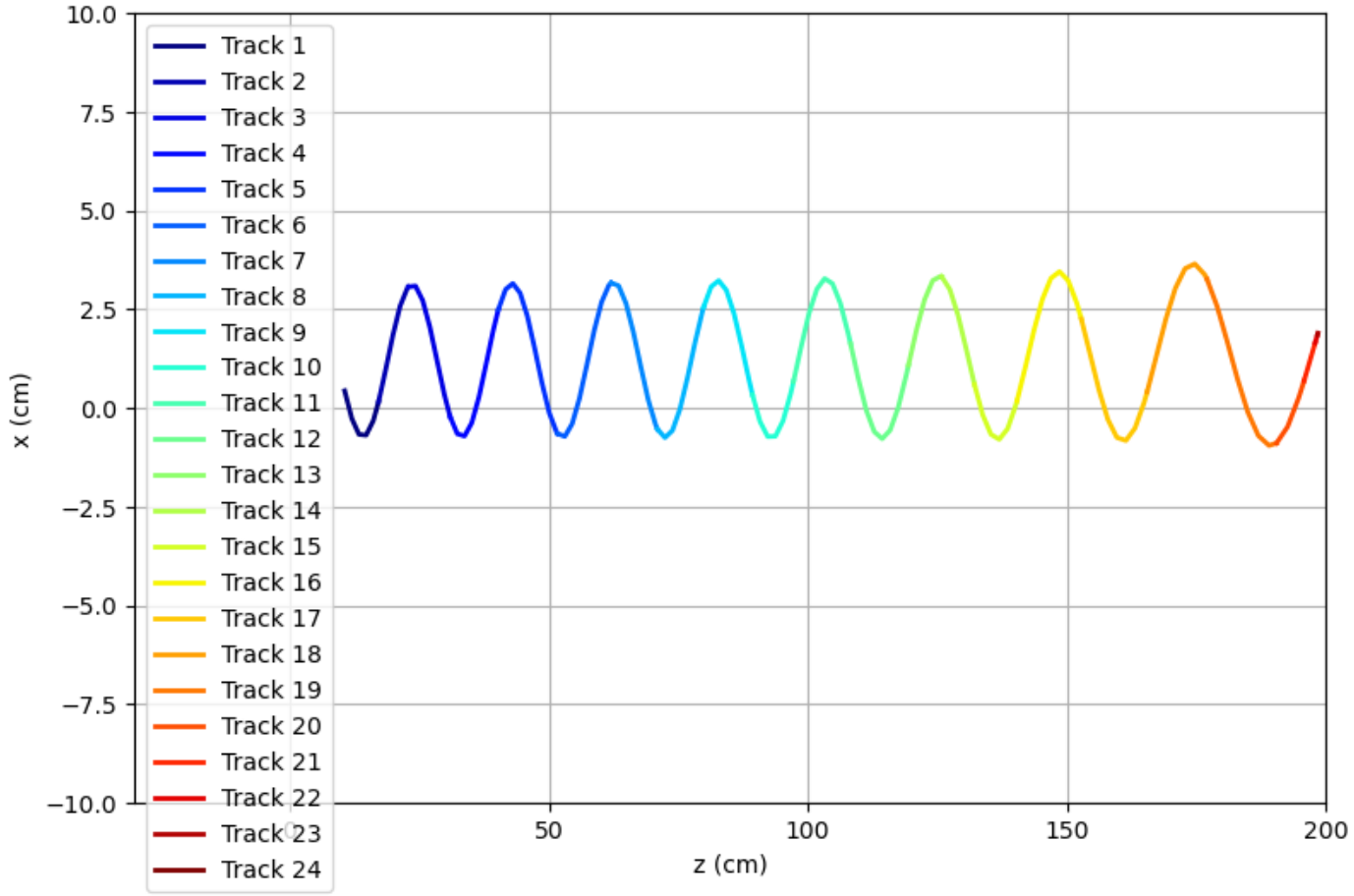
- The idea is that if we have a particle trajectory… we can trace back all the particles detected at the end of the solenoid to the point of production.



Well…

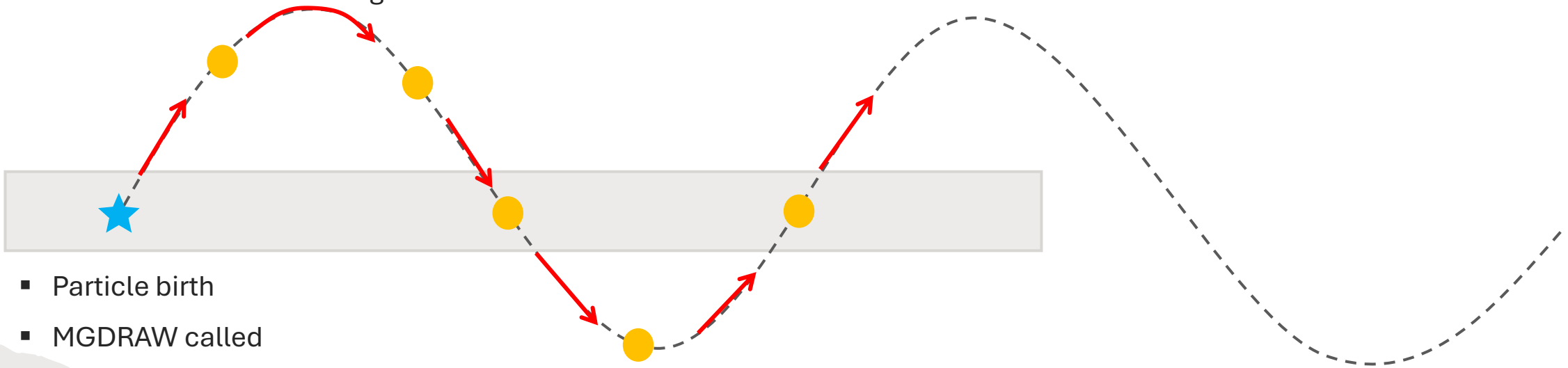
- Since our discussion last week, I learned that even particle trajectories don't have a particle ID and instead, with every step, Fluka treats every track as a separate particle.
- What you see here are different tracks generated by Fluka for "*the same particle*".
- Here, I have stitched the tracks together and defined them as generated by a single particle.

- This is a μ



Drawing trajectories…

- Track Index becomes, i = N, parameters recorded if requested
- Then instantly restarts at i = 0.
- MGDRAW called again

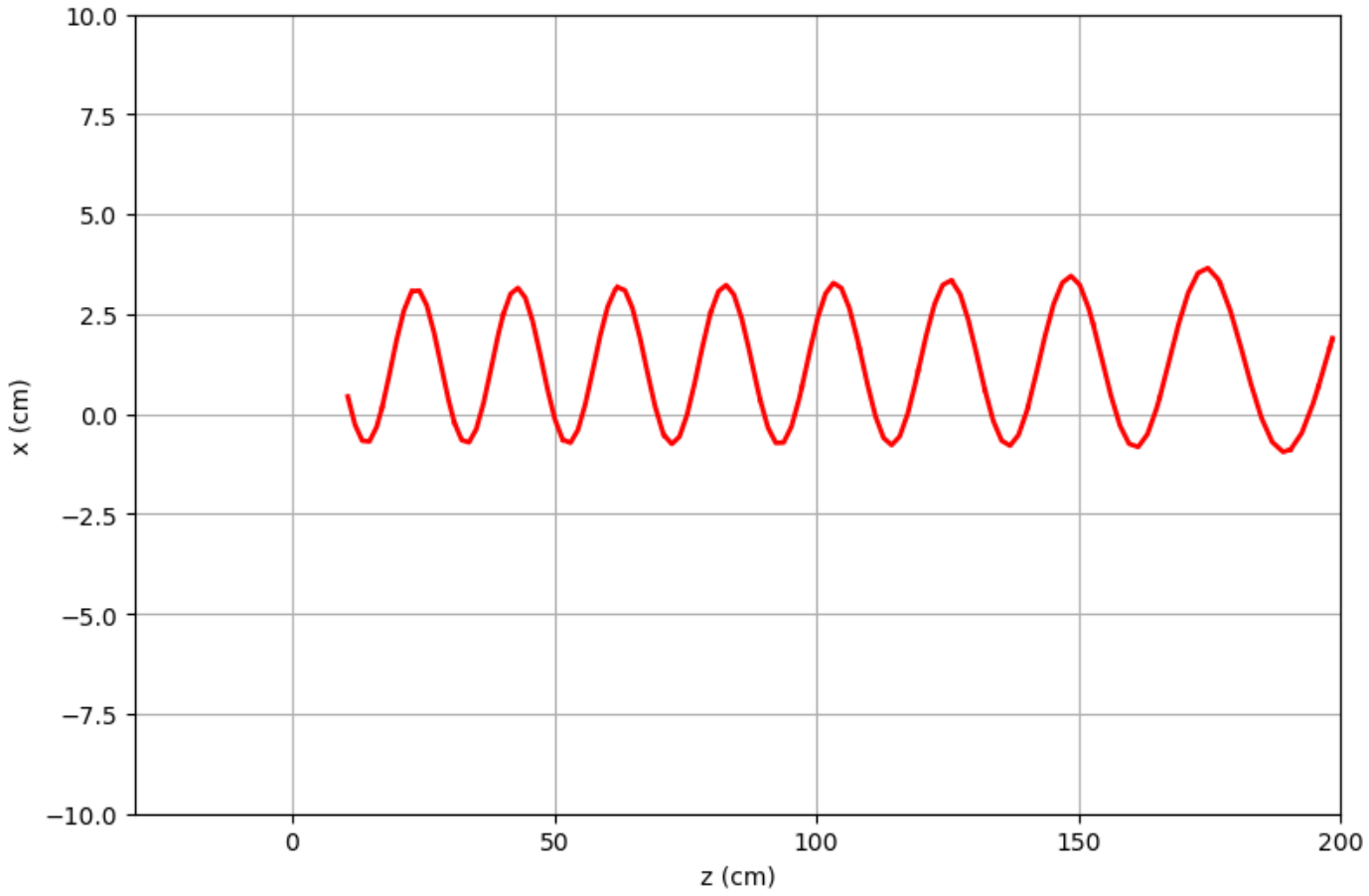


- Particle birth
- MGDRAW called
- Number N of sub-tracks is declared (loop from i = 0 to N)
- Initial parameters declared and not saved (recorded if requested)

- Every time, the loop restarts, all information is lost if not recorded.
- Therefore, information about the particle identity is also lost

My attempt to write a tracking variable…

- I attempted to write a variable that would stitch tracks that belong to the same particle as one trajectory
- I found success in stitching tracks for pions and muons.
- I am still experimenting with this variable to see if it could be used for processes other than drawing trajectories (such as boundary crossing).



Summary

- For this week, I am planning to work on recording the first and last instance of every particle trajectory if it survived at the end of the solenoid.
- I tried to use the variable at a boundary crossing, and it worked!
- Hopefully, next week I will have *new*, more realistic results.