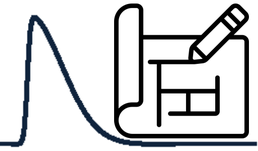
Update on Internal Source Distribution

Recap: Ideally internal sources are…

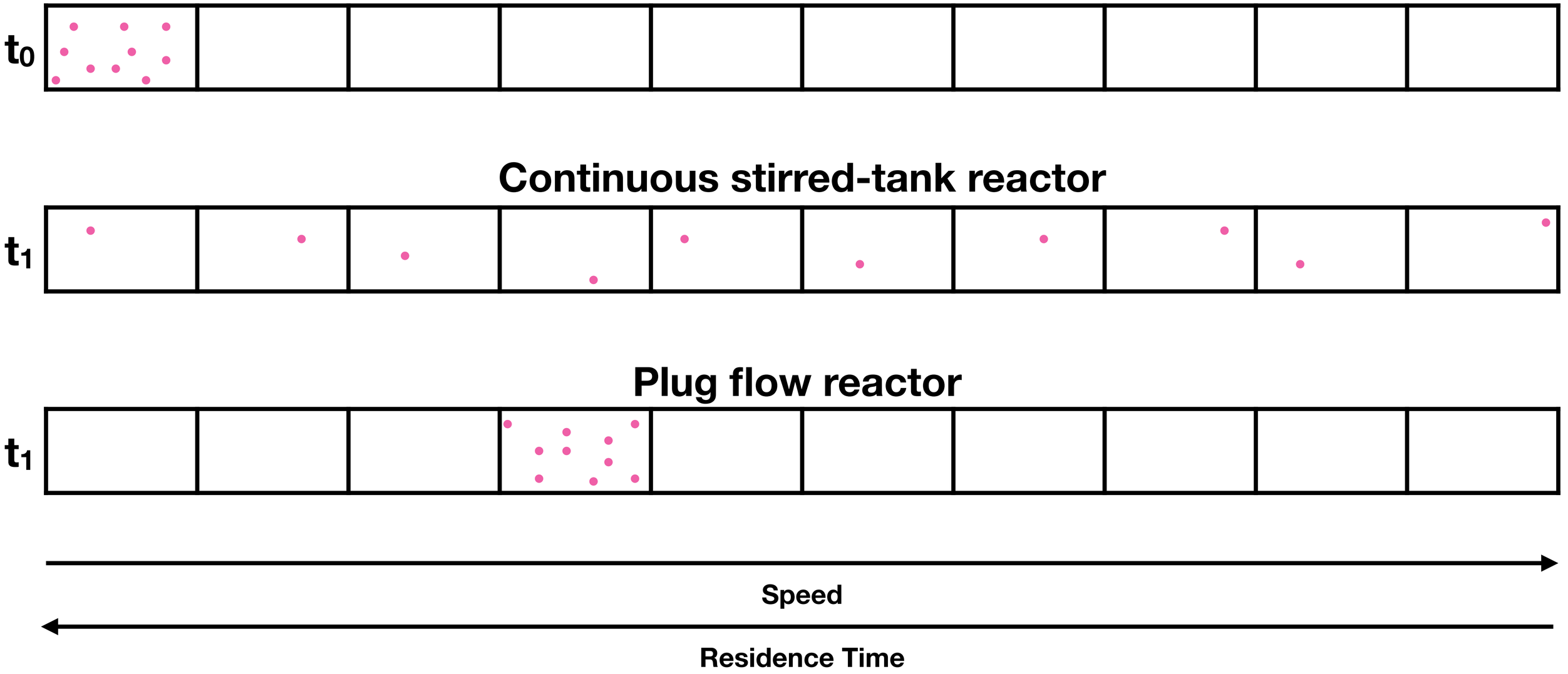


-> See presentation from 18.12.2023

- Mixed well
- Deployed fast

Good or *Bad* Mixing

- How is good mixing quantified? -> equal, homogeneous distribution, without blind spots



Residence Time Distribution

- At the outlet

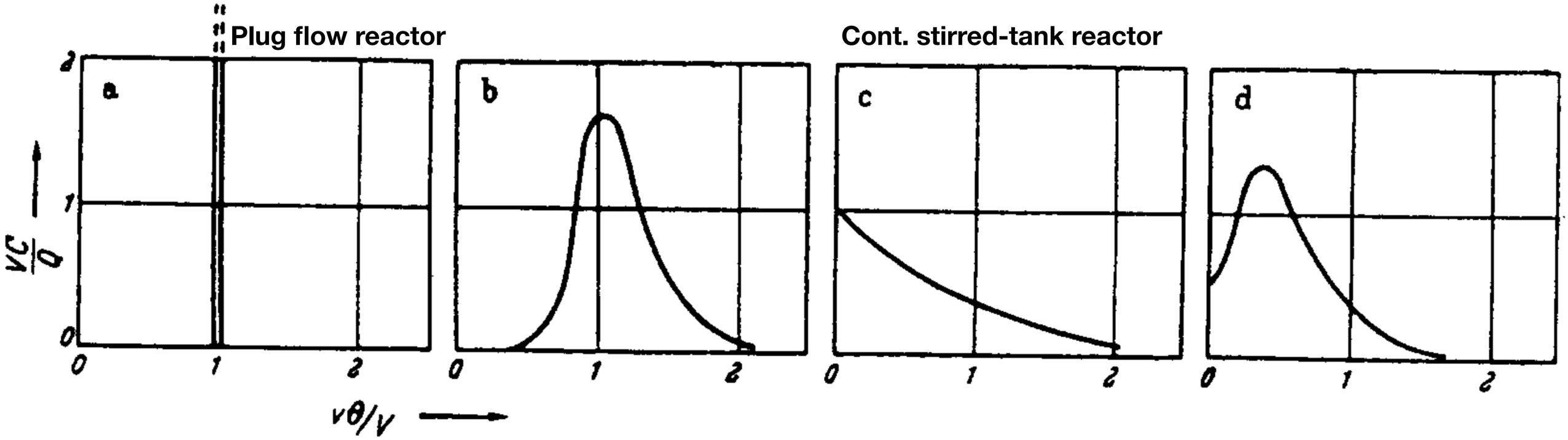
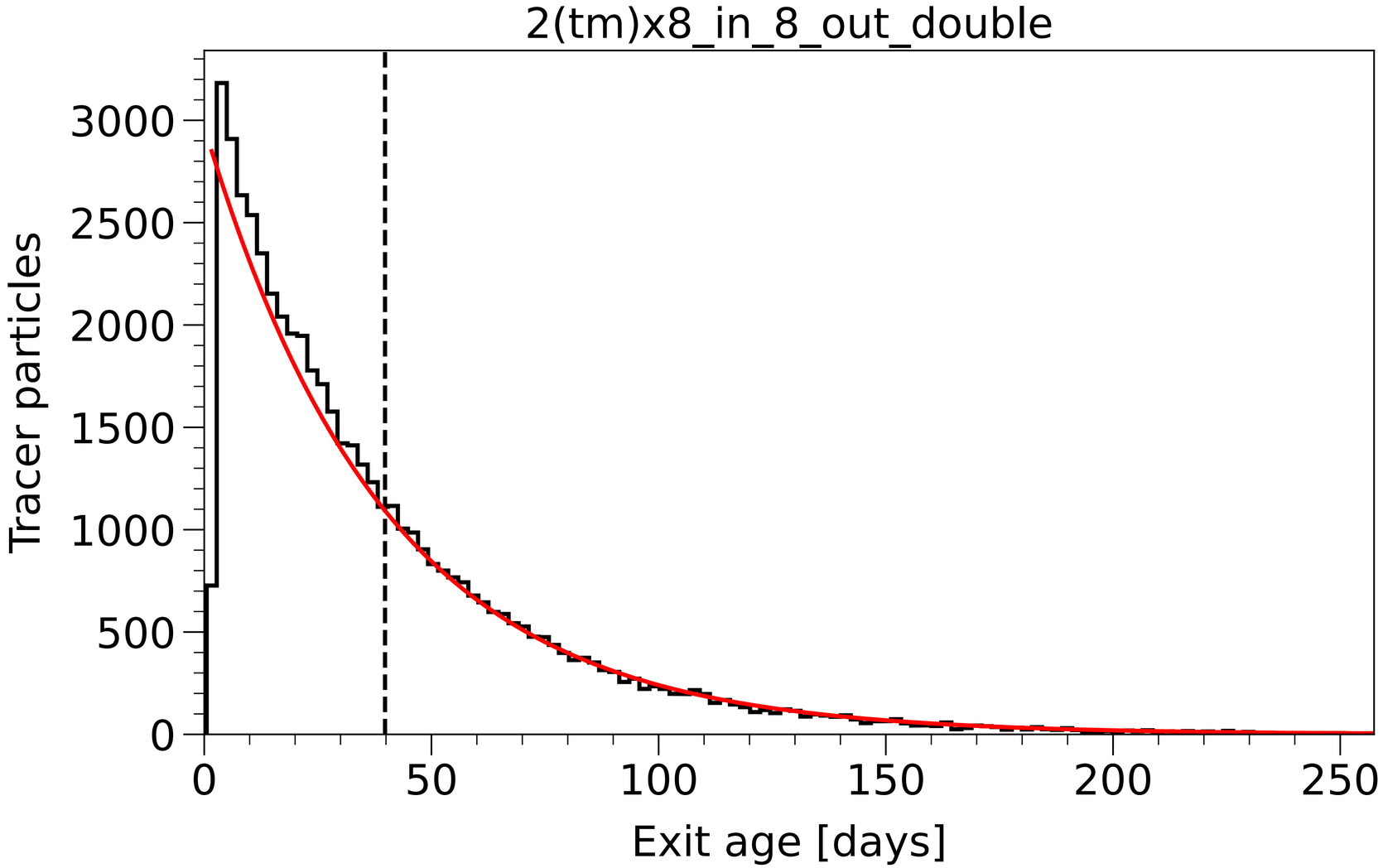
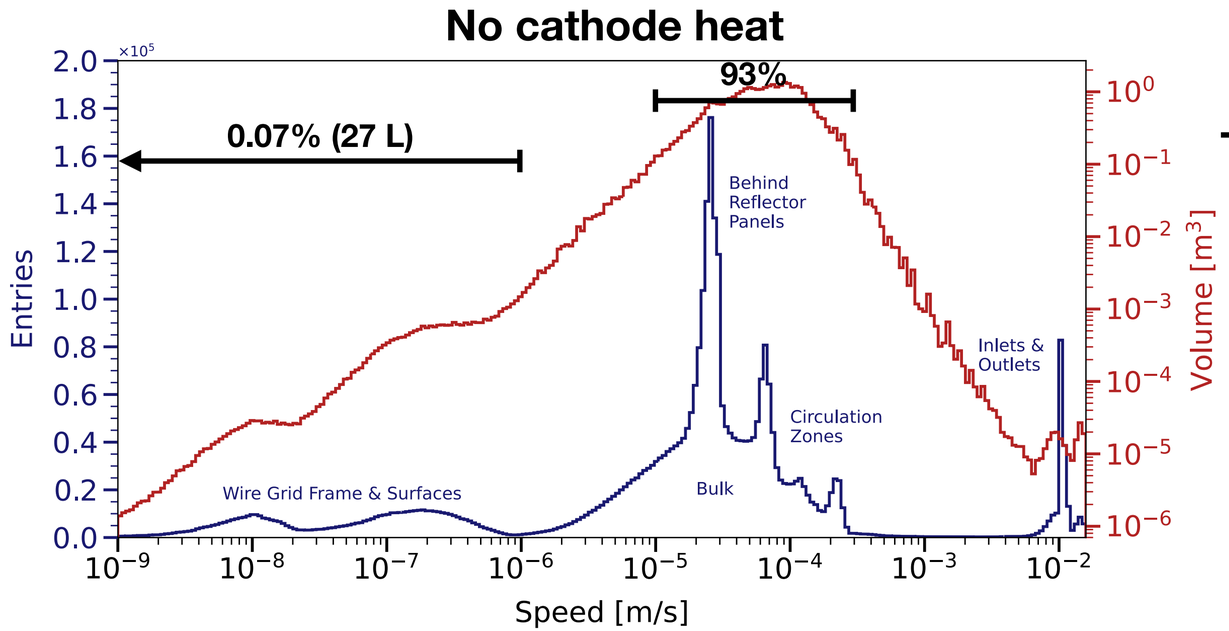


Fig. 2. *C*-diagrams: (a) piston flow; (b) piston flow with some longitudinal mixing; (c) complete mixing; (d) dead water.

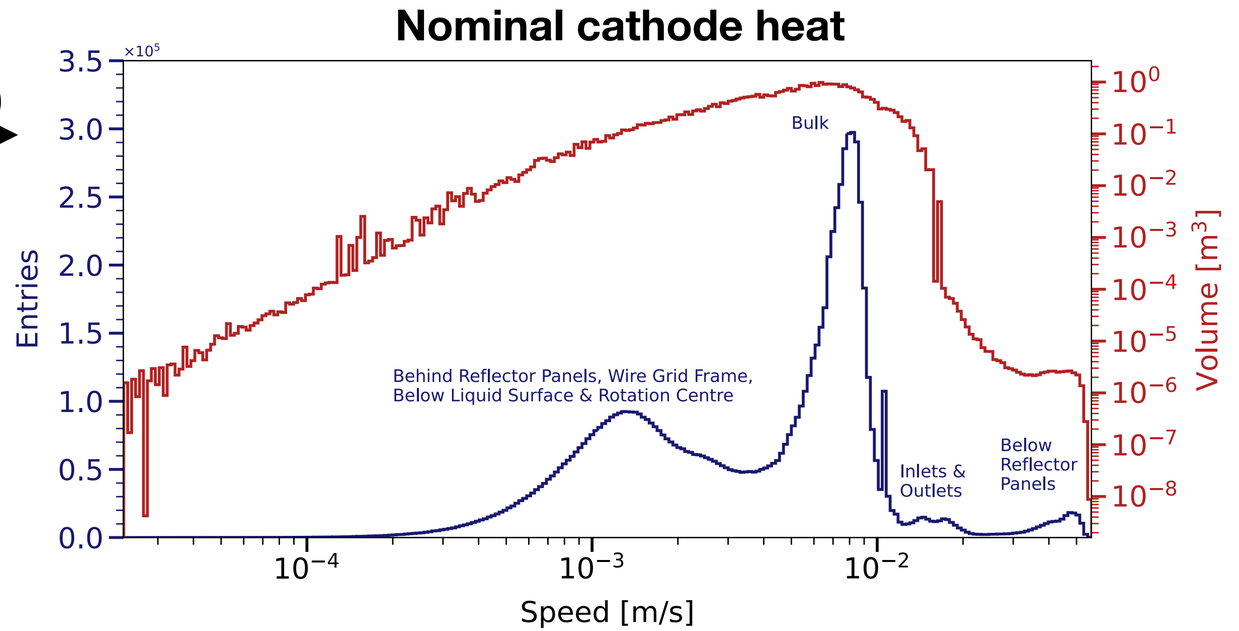
Residence Time Distribution

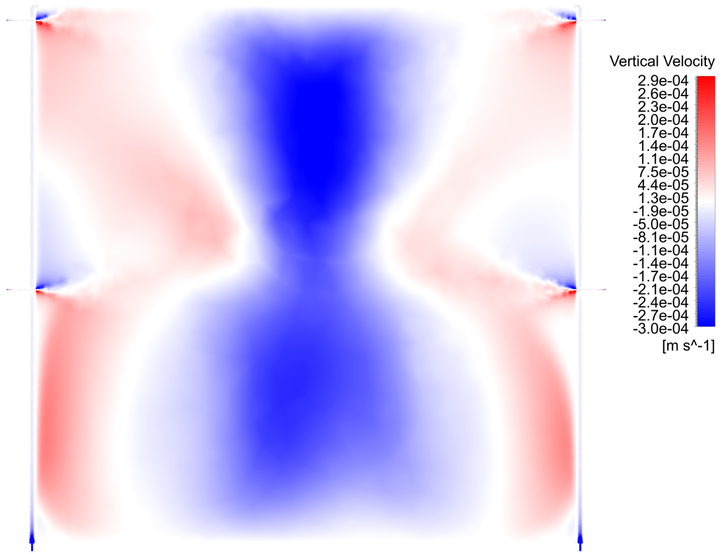


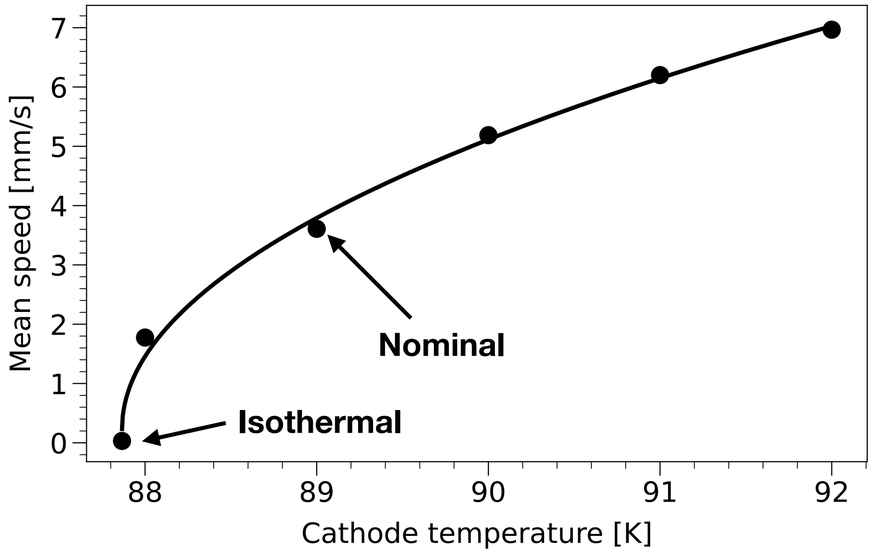
Speeds in the TPC

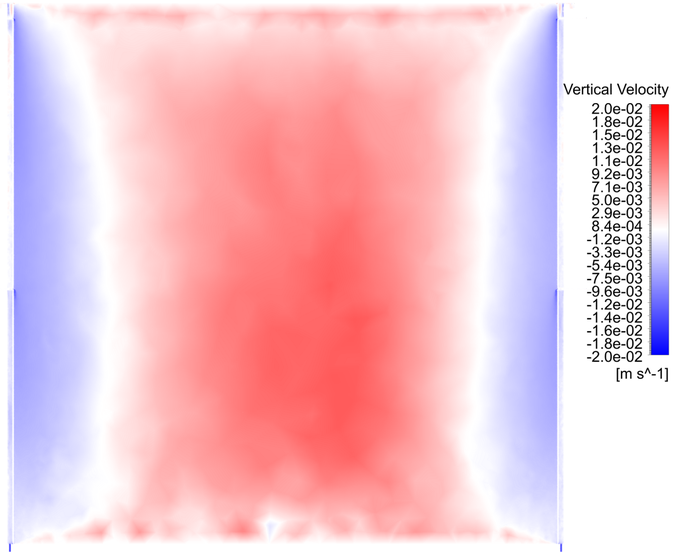


x100





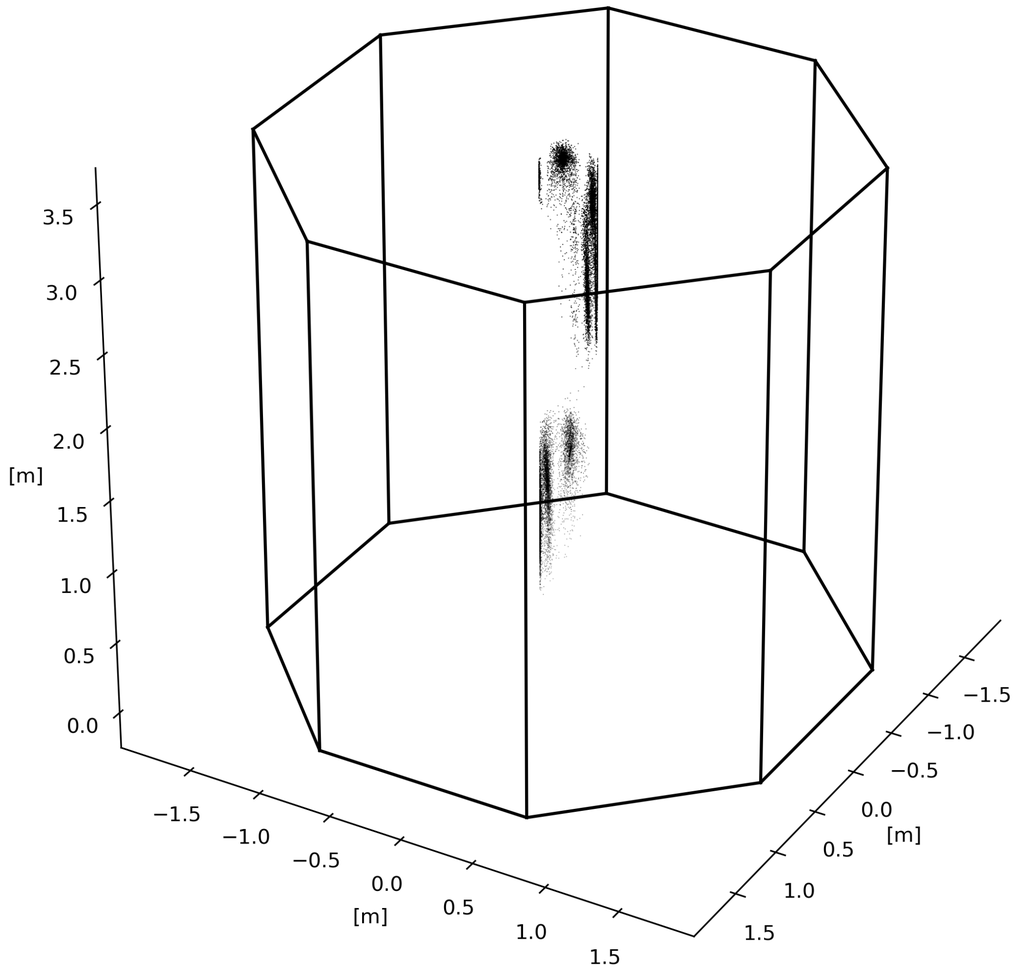




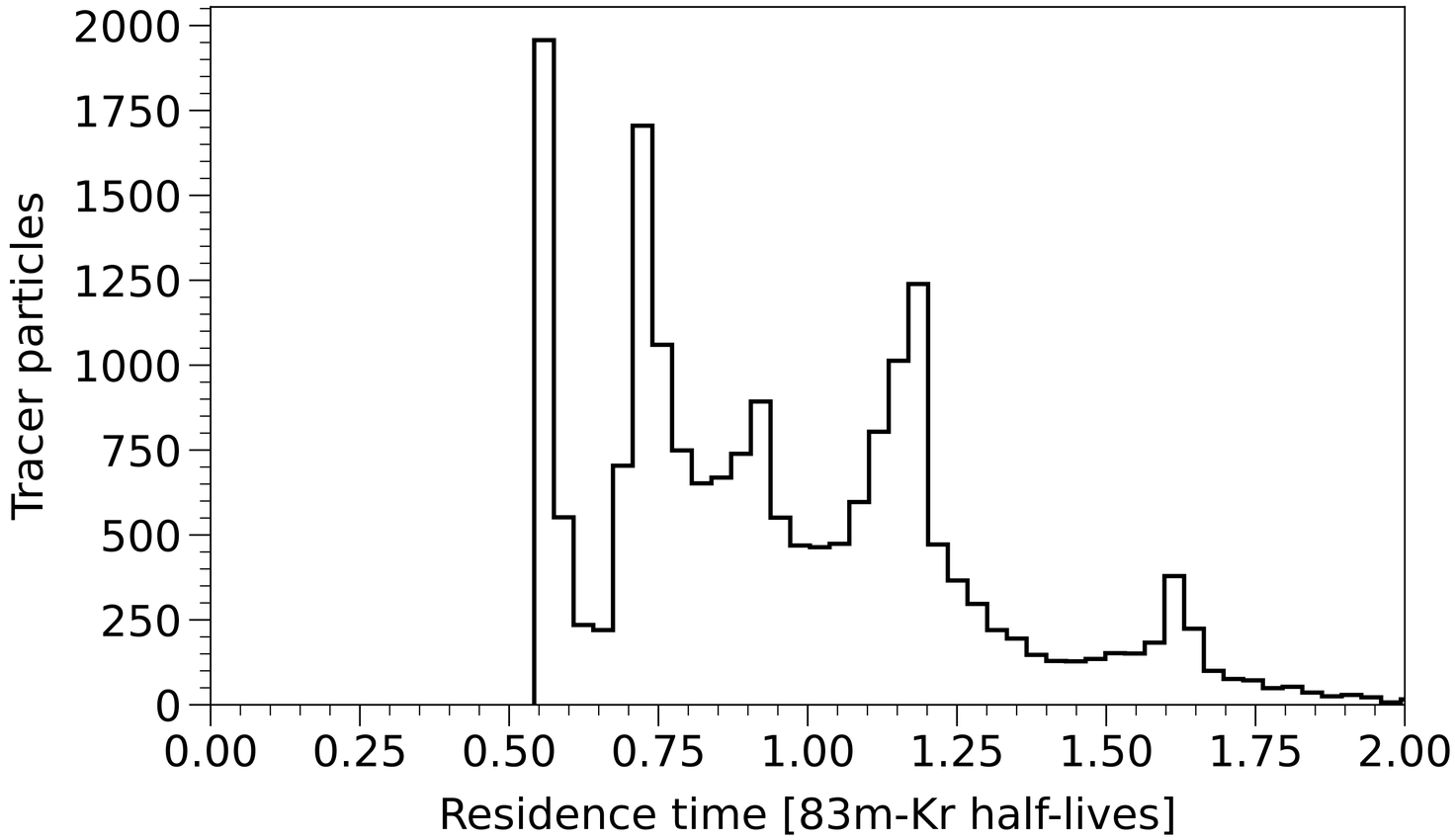
Does an internal source reach the lateral centre of the TPC?

- Define cylinder shell in the TPC centre with R=17.5 cm (1/10 of the TPC inscribed circle radius)
- Release tracer particles from the inlet surfaces and collect them on the cylinder shell
- Record impact sites and residence time for 10 83m-Kr half-lives

Does an internal source reach the lateral centre of the TPC?



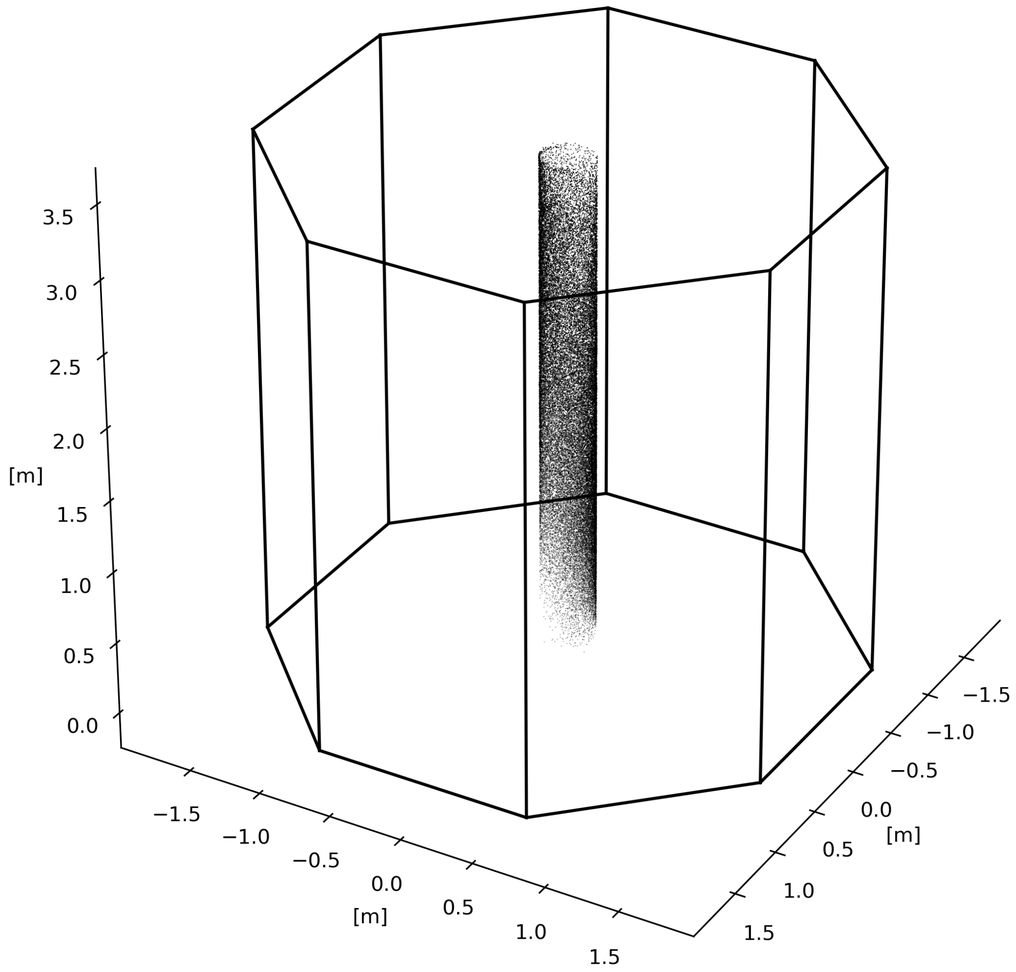
No cathode heat

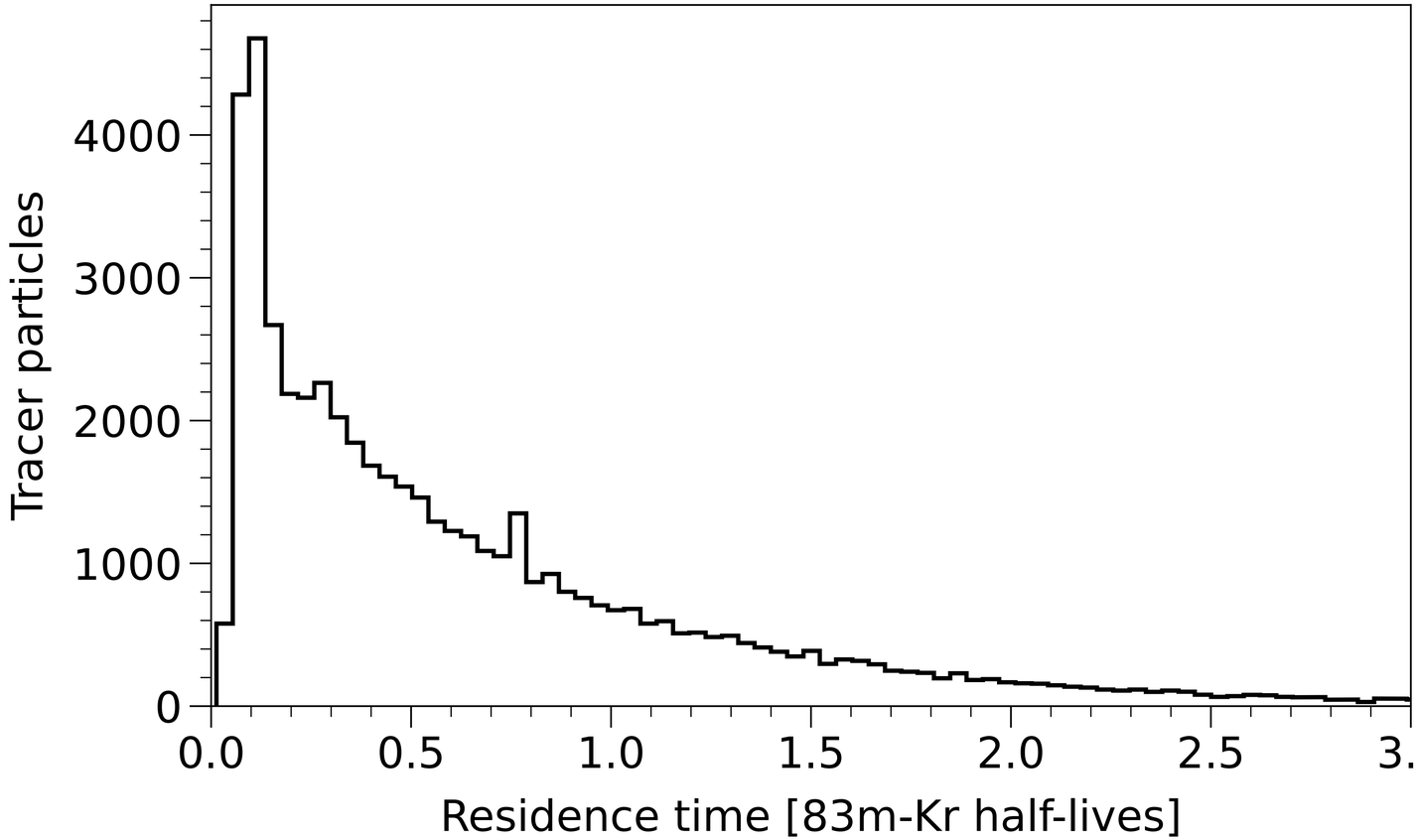


- Delayed (0.54 $T_{1/2}$) and discrete arrival in batches
- Within 10 $T_{1/2}$ 39% of the tracers were collected
- > 94% of the collected tracers arrive within 2 $T_{1/2}$

Does an internal source reach the lateral centre of the TPC?

Nominal cathode heat

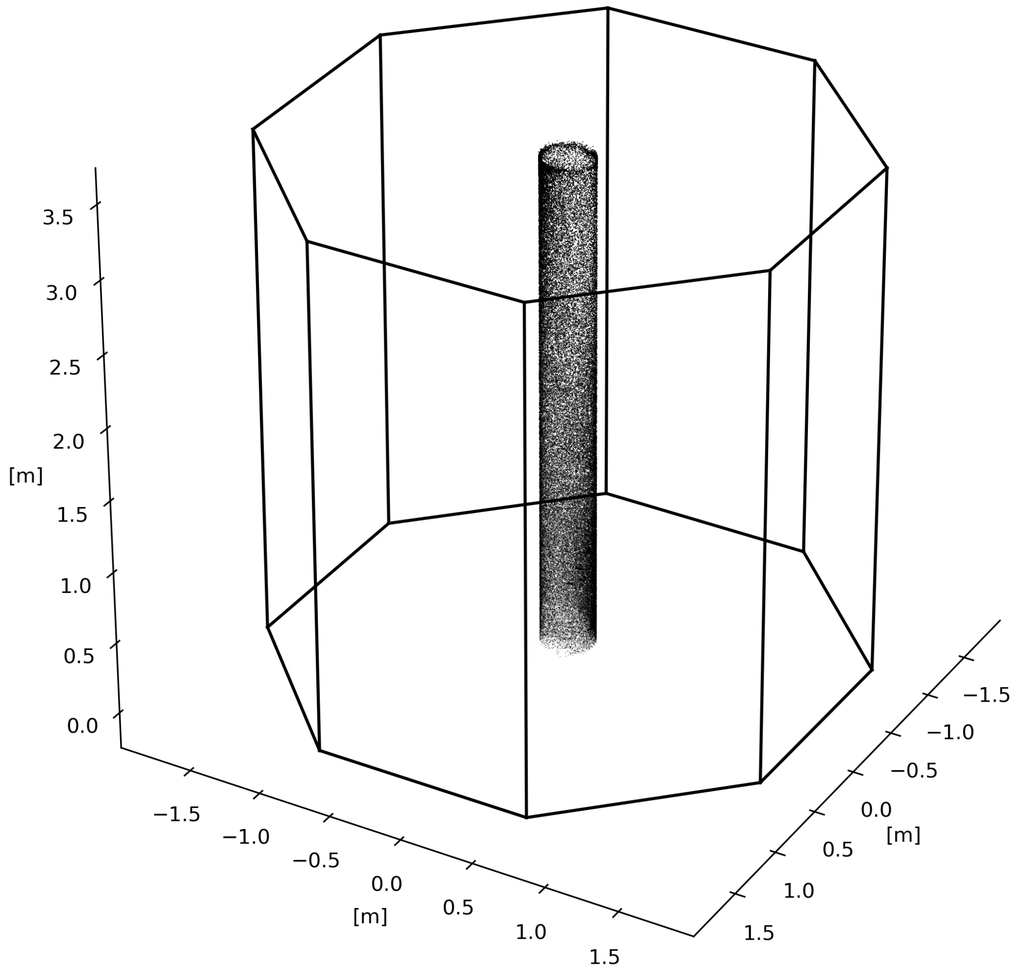


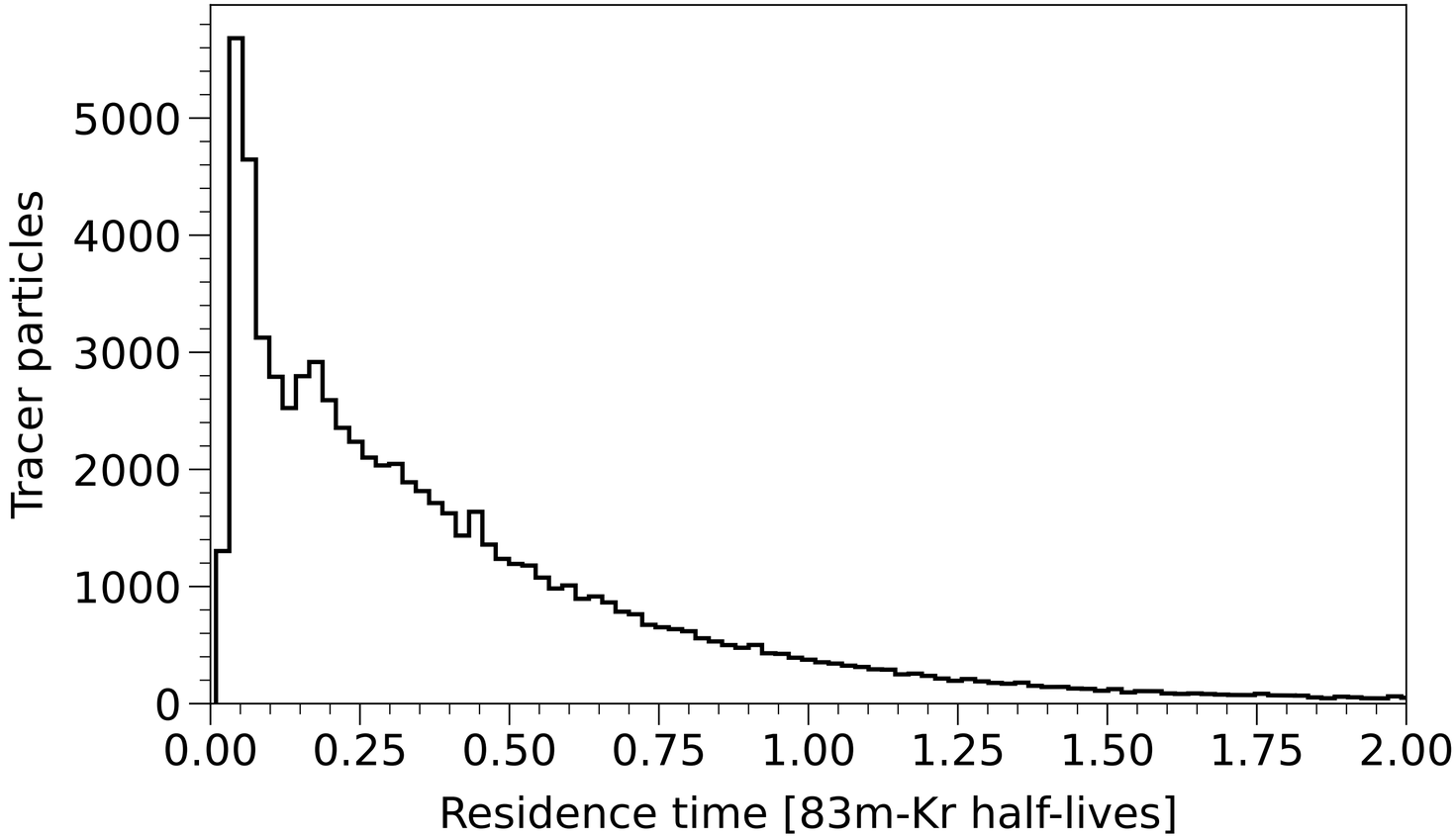


- Almost no delay, arrival as expected in well-mixed volume
- Homogeneous
- Within 10 $T_{1/2}$ 99% of the tracers were collected
- > 94% of the collected tracers arrive within 2 $T_{1/2}$, 98% within 3 $T_{1/2}$

Does an internal source reach the lateral centre of the TPC?

Maximum cathode heat without boiling





- Almost no delay, arrival as expected in well-mixed volume
- Homogeneous
- Within 10 $T_{1/2}$ 99% of the tracers were collected
- > 98% of the collected tracers arrive within 2 $T_{1/2}$

Summary

- Excellent prospects for sources injected into the liquid
- We expect first events in the lateral TPC centre at 0.2 $T_{1/2}$

Thank you for listening!

Backup Slides

Geometry

- Simplified, full-size 3D geometry according to baseline ID design
- Abstract inner TPC volume defined by the TPC walls cathode, anode, reflector walls
- Details such as field shaping rings, gate grid and fasteners are omitted