First look at slow case

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21st CWG

Slow losses

Beam lifetime: **0.2 h**		Loss rate:	4.1e11	p/s
			3.6e7	p/turn
		Loss in 10 s:	4.1e12	p
			1.4	**%**

Assume drift:	0.3	sig/s	*(uniform "emittance" blow-up)*
	2.7e-5	sig/turn	
	5.3	**nm/turn**	(sigma = 200 micron)

Simulate:	10	s	
	112360	turns	(1.1e5)
	1.1e5	turns	
	4.1e12	p	

Representation:	360	p/turn	(1p represents 1e5 real p)
	40e6	p*turn	(if 360 generated just-in-time per turn)

Impossible to track with 1 p (sim) per 1e5 p (real). If each particle stays 100 turns: 100 times above CPU limit.

New PC set up. This will help… But not enough…

Break problem down:

One approach

1. Generate particles from 6 σ to (6 + 5 nm/σ) σ.

2. Track until all particles are lost (~ 1000 turns), applying 5 nm/turn outward drift.

3. Save impact distribution on primary (integrated or per turn? **time resolution**?).

4. Assume all 1.1e5 turns have the same loss signature. Multiply impact distribution by ~1.1e5.

This approach requires **good statistics** (much more than 360 particles), especially as we are interested in the edge scattering! Lengthy again!

Use the **same material** in our code and FLUKA (particle absorption must agree)!

Use the **same length**!

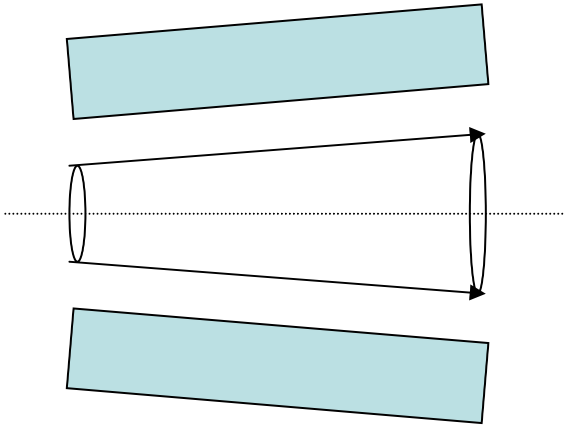
Define input case in detail or easy way to scale to other materials?

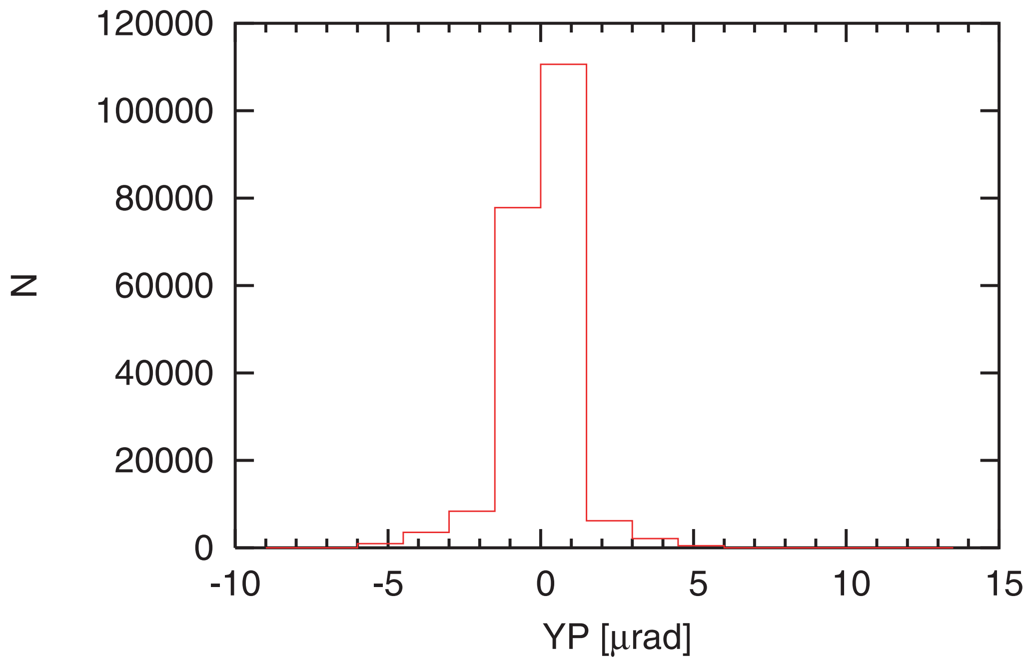
Most simple case:

1) Al/Cu system

2) Beam jaw angle aligned:

Angle is 17.6 μrad

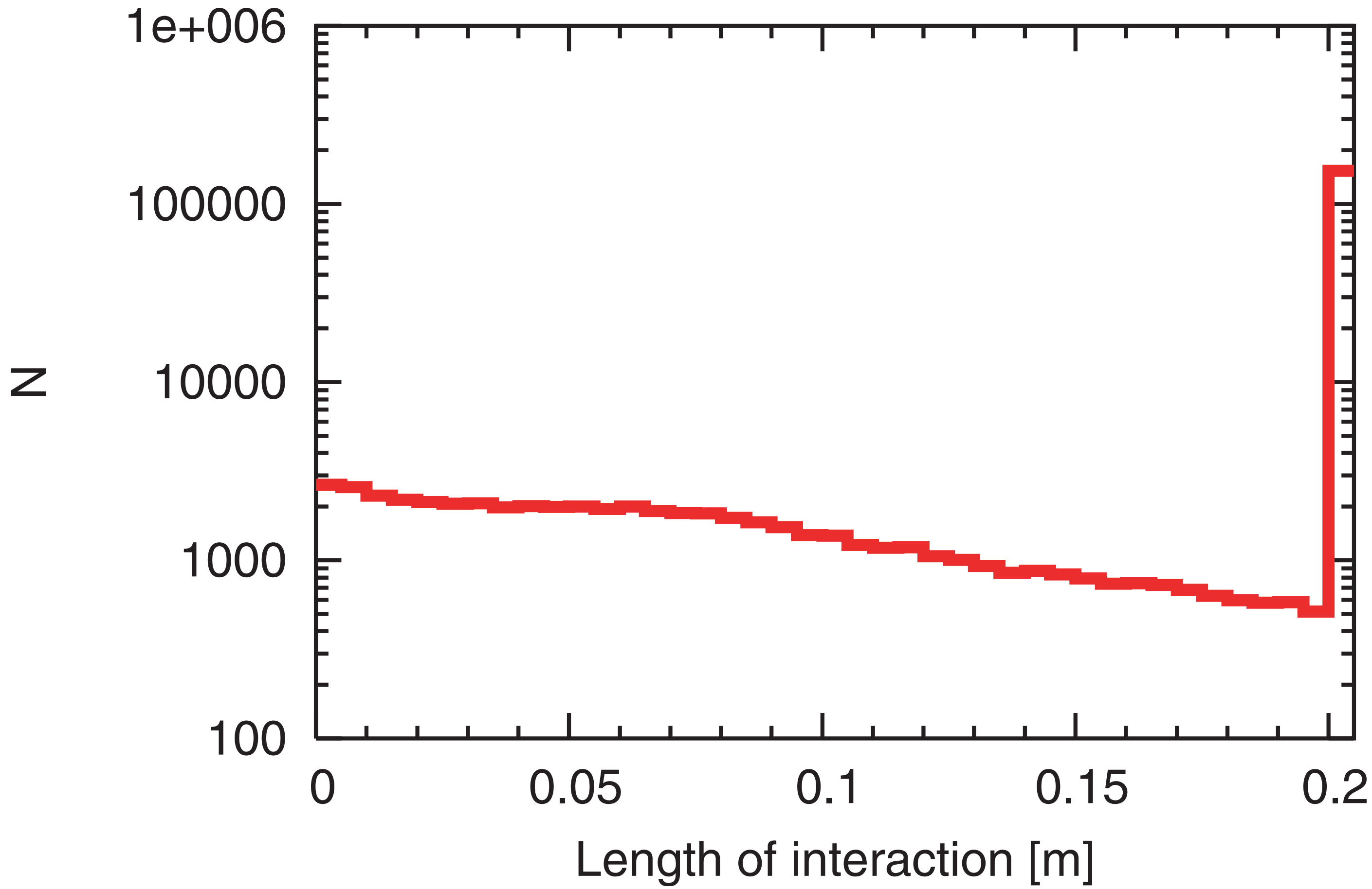




Particles are roughly perpendicular to the face of the jaw!

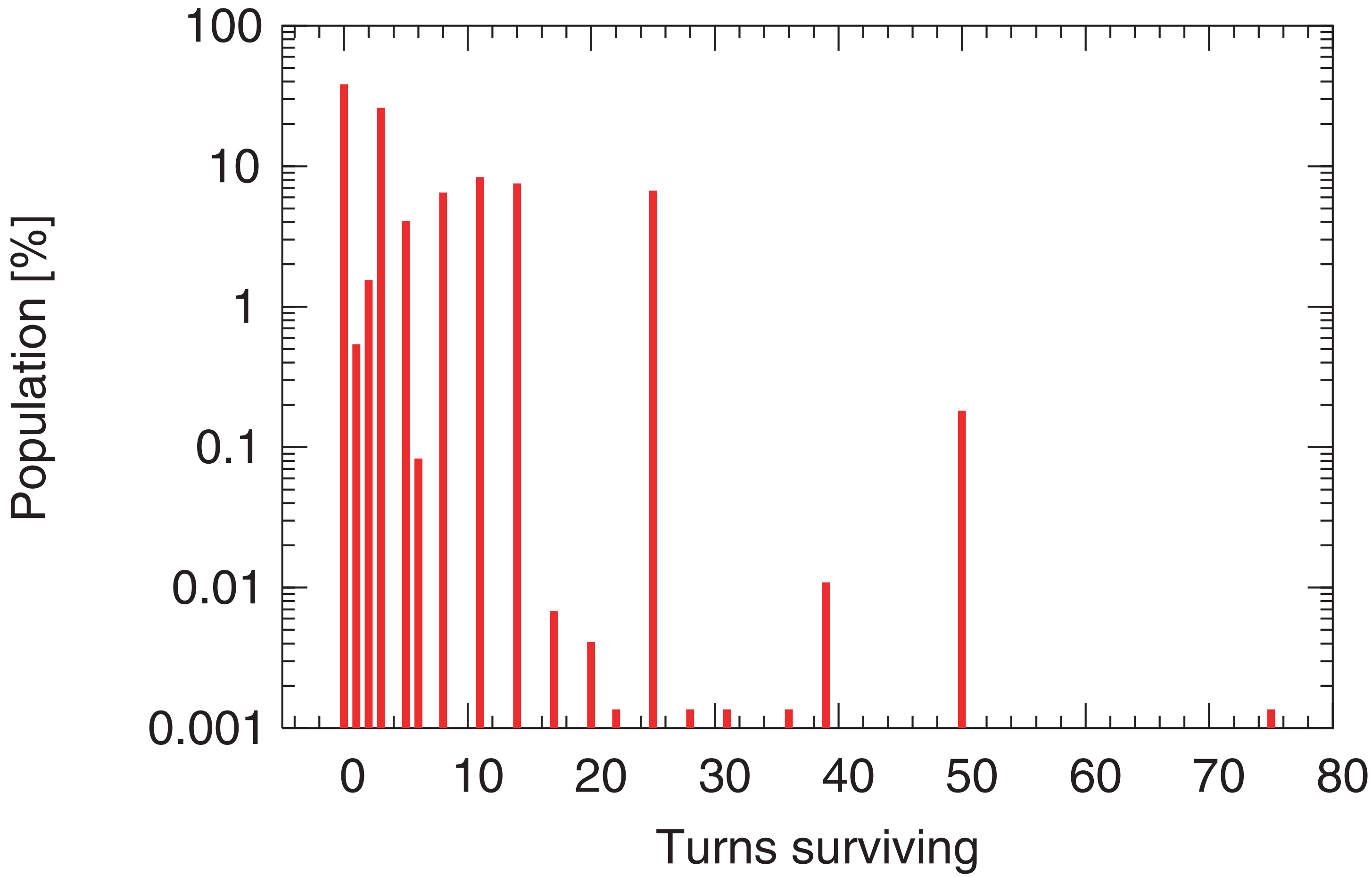
3) About 600 turns to absorb all particles!

Length of interaction:



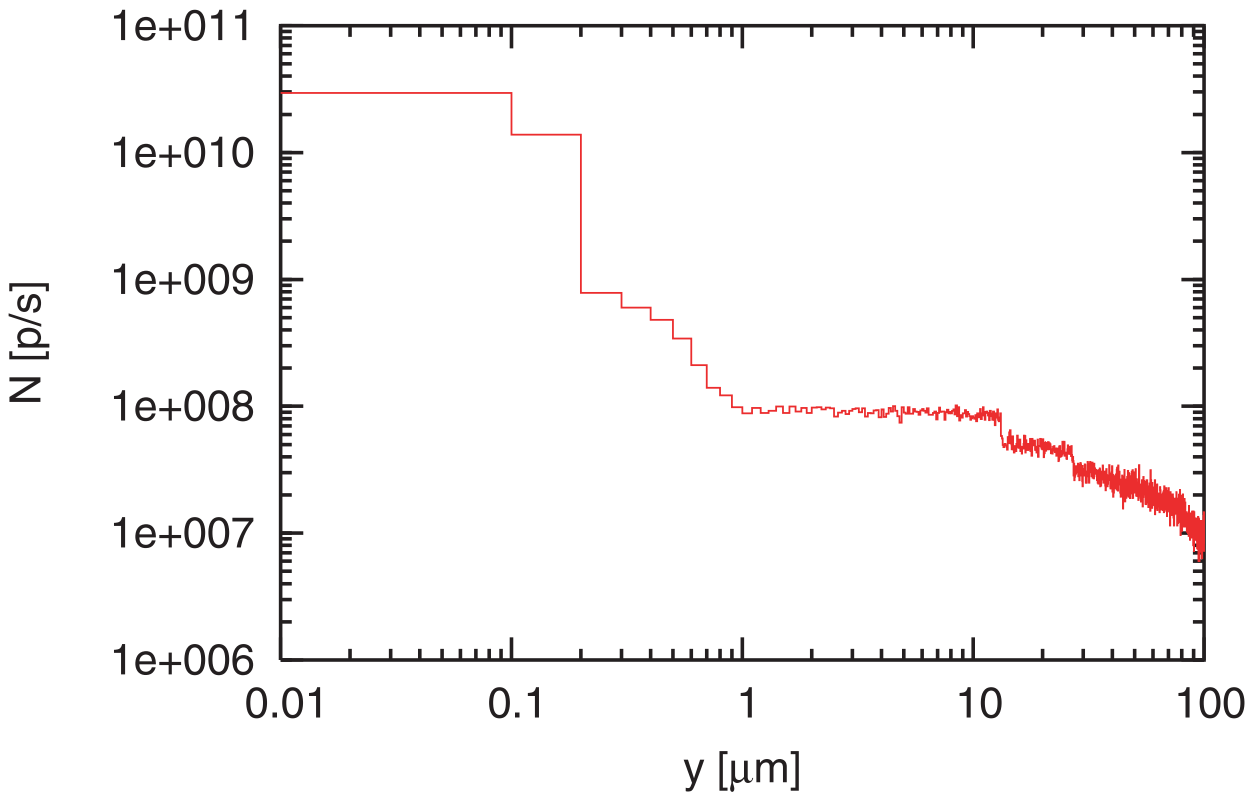
Most particles traverse the full 0.2 m length of the Al jaw!

Number of turns after interaction before particle is absorbed:



Average survival: **5.8 turns** (primary collimator)

About 75% of particles have inelastic interaction in primary jaw!



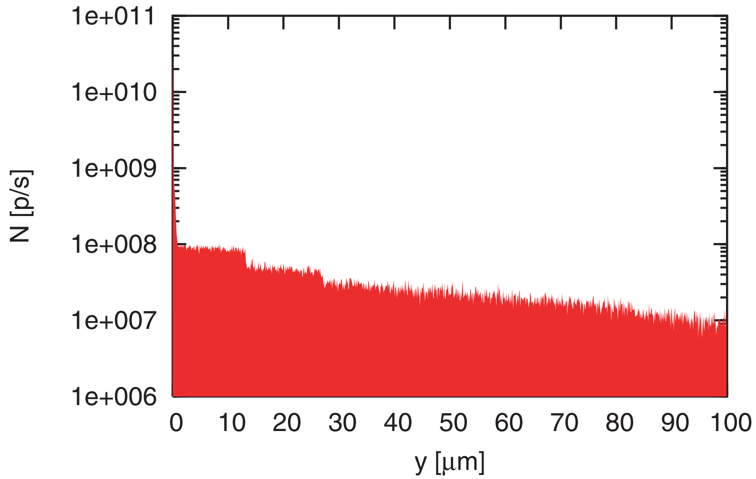
Transverse impact parameter

Almost all particles impact with

y ≤ 0.2 μm

Surface phenomenon!

Linear scale:



Tool is ready to produce input:

Define cases for FLUKA…

- C system 0.2 m / 1.0 m
- Impact at primary (emittance drift)
- Impact at secondary (orbit drift)
- Impact coordinates of particles in coordinate system of the jaw?