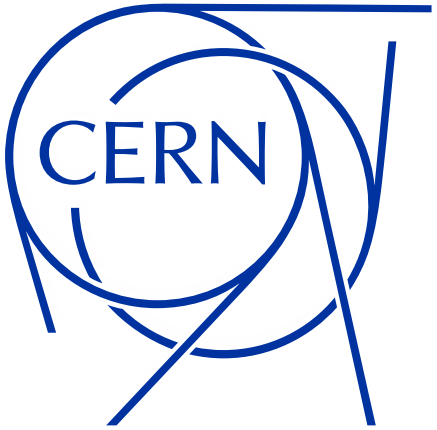

Rise time instability

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21/10/2024

Rise time instability model

- **Instability modeled as 8 exciters distributed along the ring with strength growing with time.**
- **Exciters strength is an exponential function modulated by a cosine:**

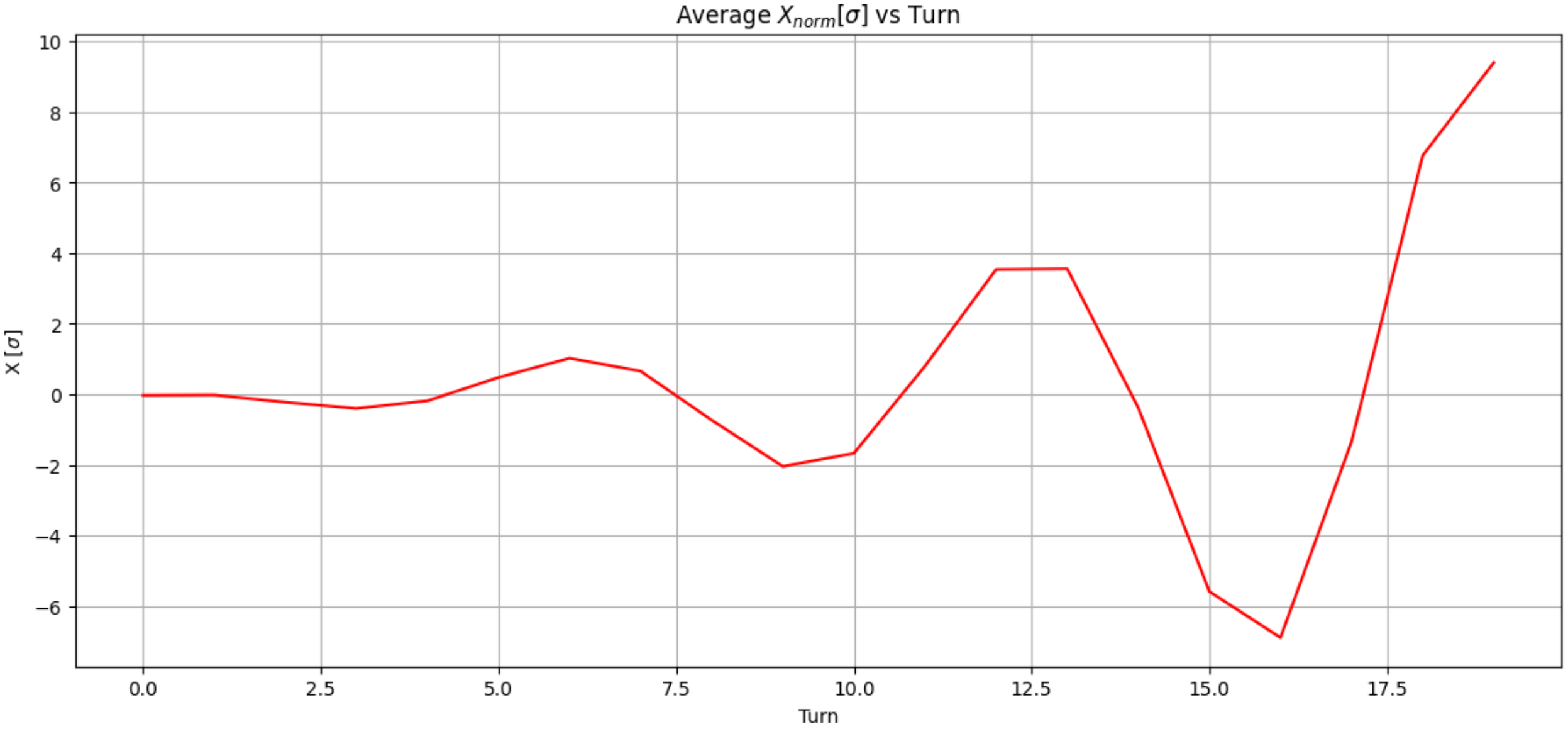
$$k = \frac{A_0}{\beta_x} e^{t/\tau} \cos(2\pi f_{rev} Q_x t)$$

- **Particles are kicked every turn → exponential growth of the oscillation amplitudine**
- **Rise time: $\tau \sim 6$ turns or $\tau \sim 3$ turns**
- **Different placement of the exciter wrt first collimator to study the phase depence of the effect**

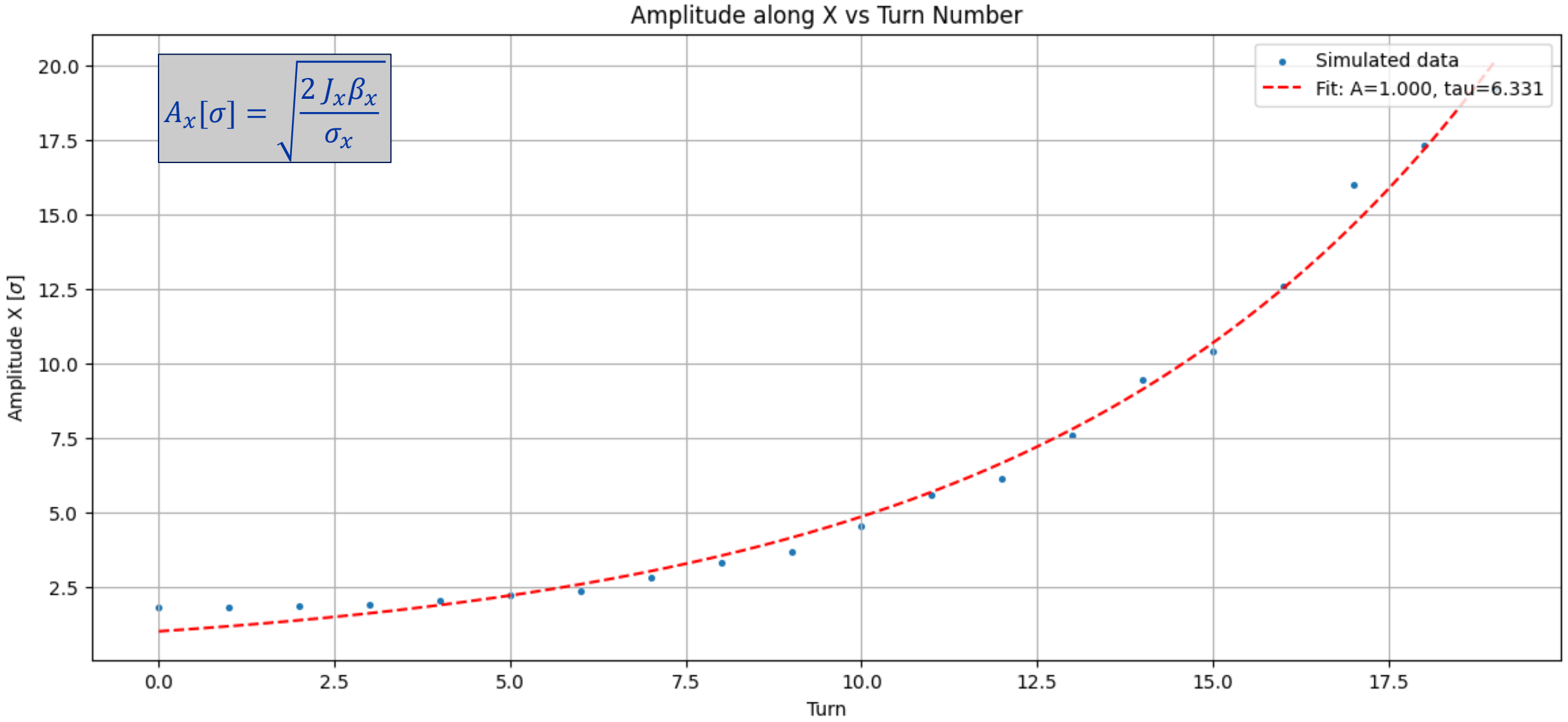
Horizontal kick at $\mu = 0°$ wrt TCP.H.B1

6 TURNS RISE TIME – 4.75e5 PARTICLES

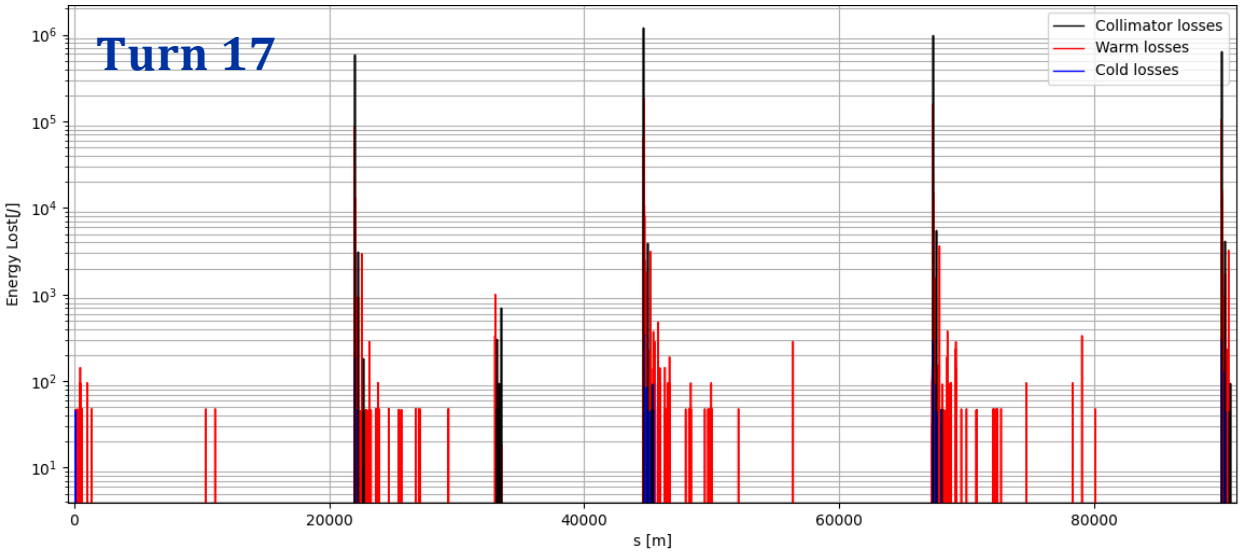
Normalized X at TCP.H.B1

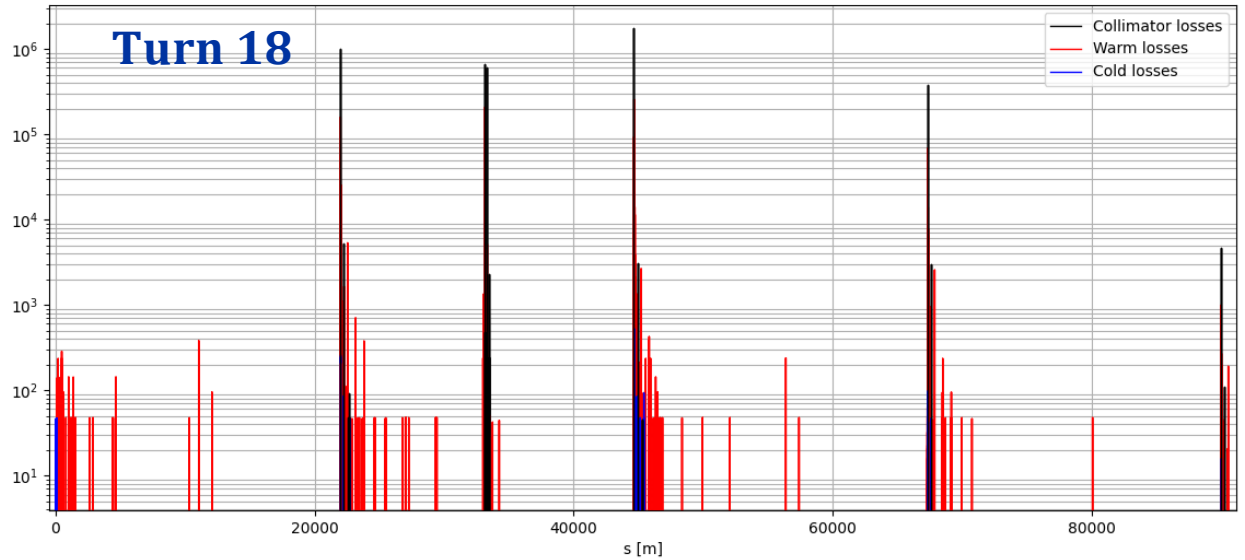


Normalized amplitude at TCP.H.B1

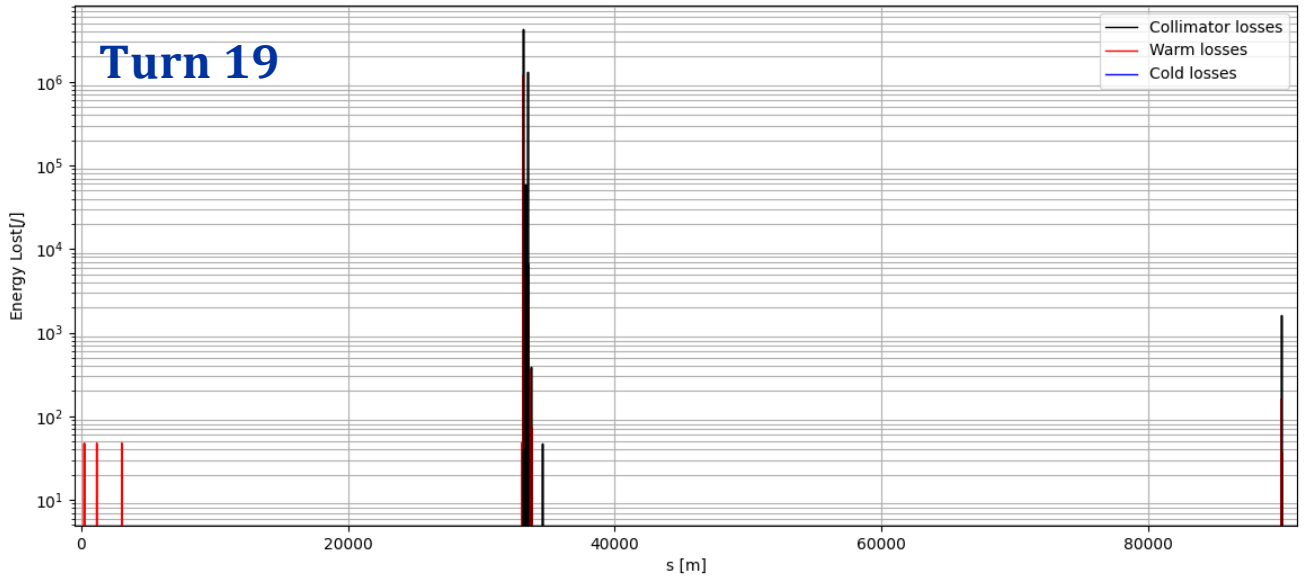


Lossmaps per turn (bin = 10 cm)

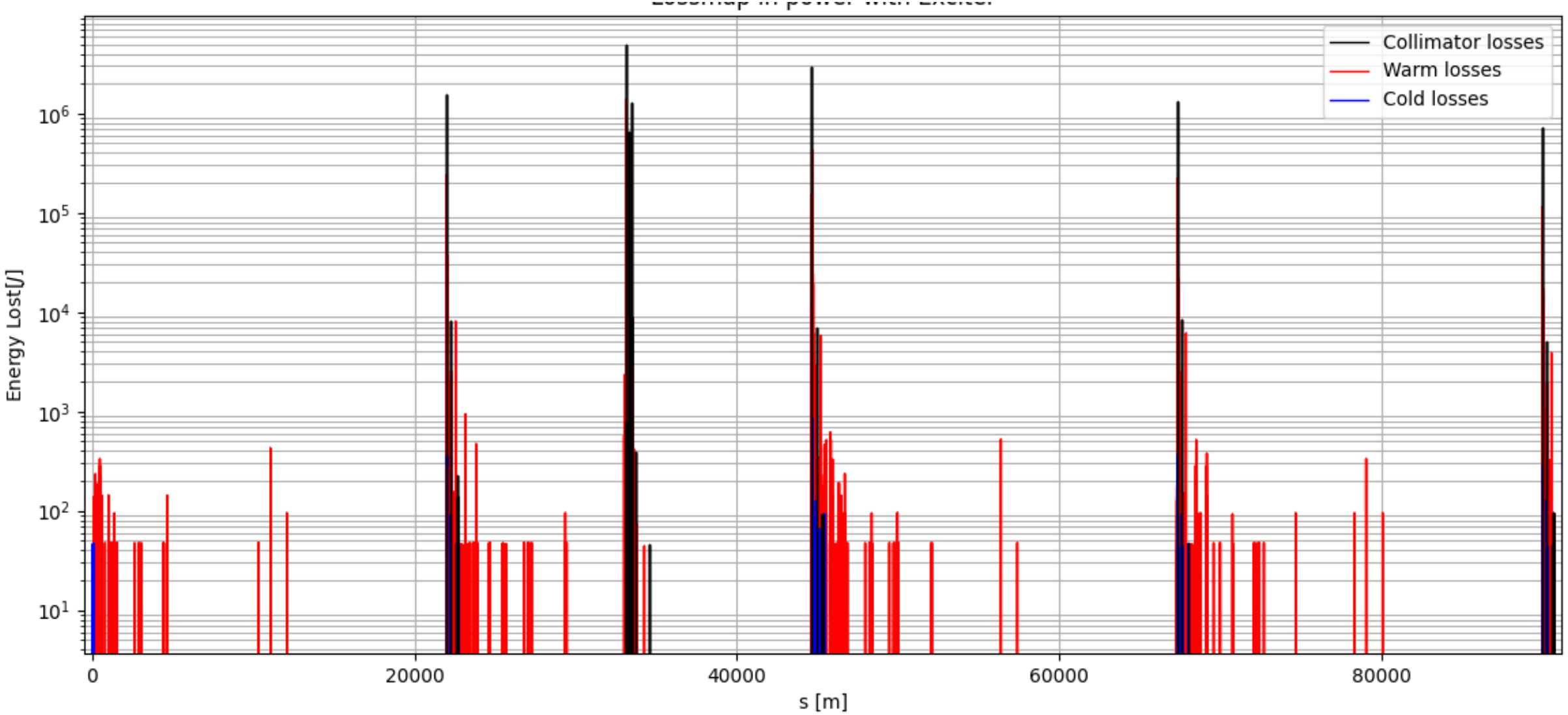




- Most particles are lost at turn 17 and 18
- Still relevant at turn 19
- Energy lost up to turn 16 $\sim 0.2\ MJ$
- Energy lost up to turn 15 $\sim 50\ J$



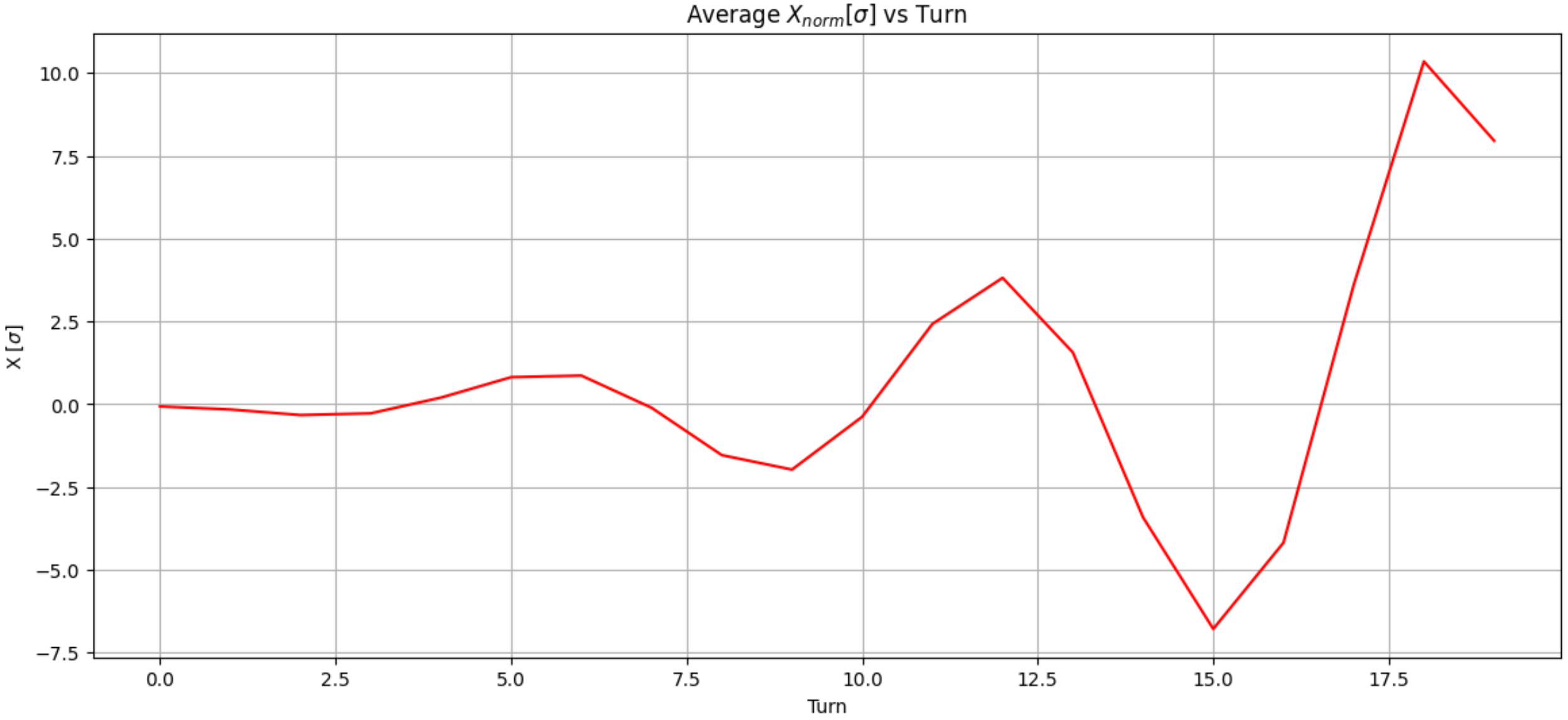
Lossmap all turn in power (bin = 10 cm)



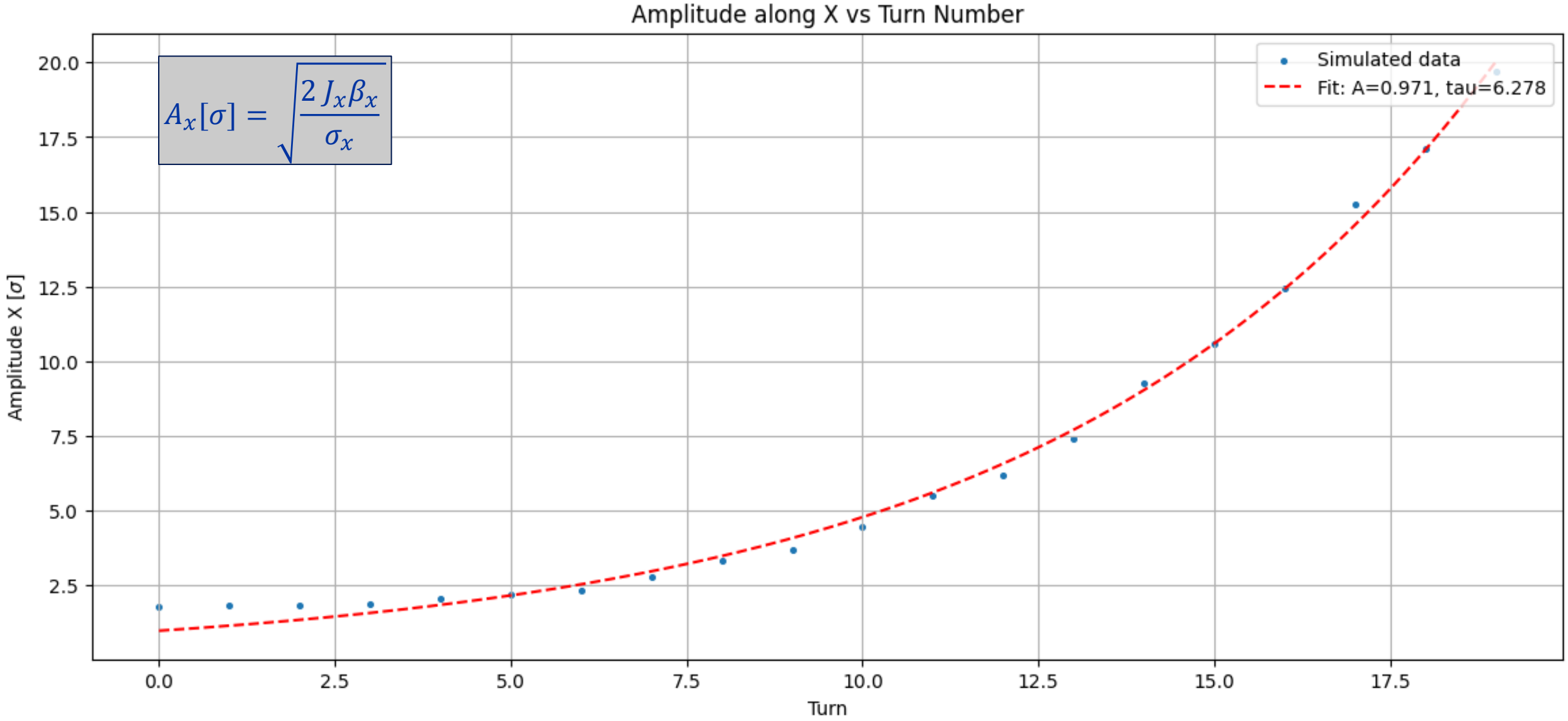
Horizontal kick at $\mu = 30°$ wrt TCP.H.B1

6 TURNS RISE TIME – 4.75e5 PARTICLES

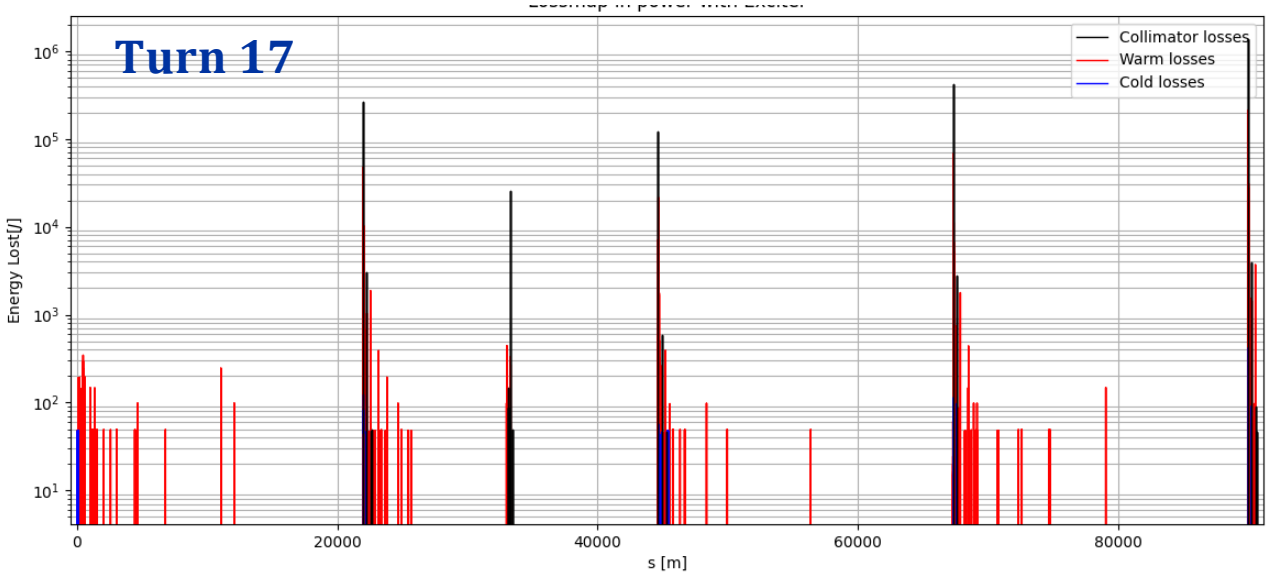
Normalized X at TCP.H.B1

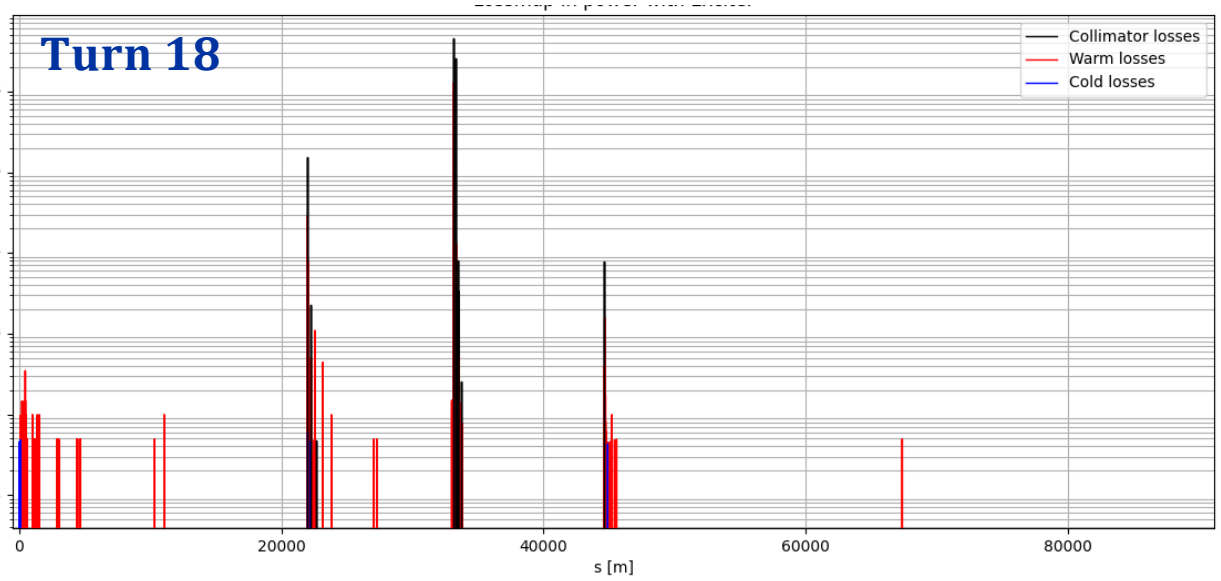


Normalized amplitude at TCP.H.B1

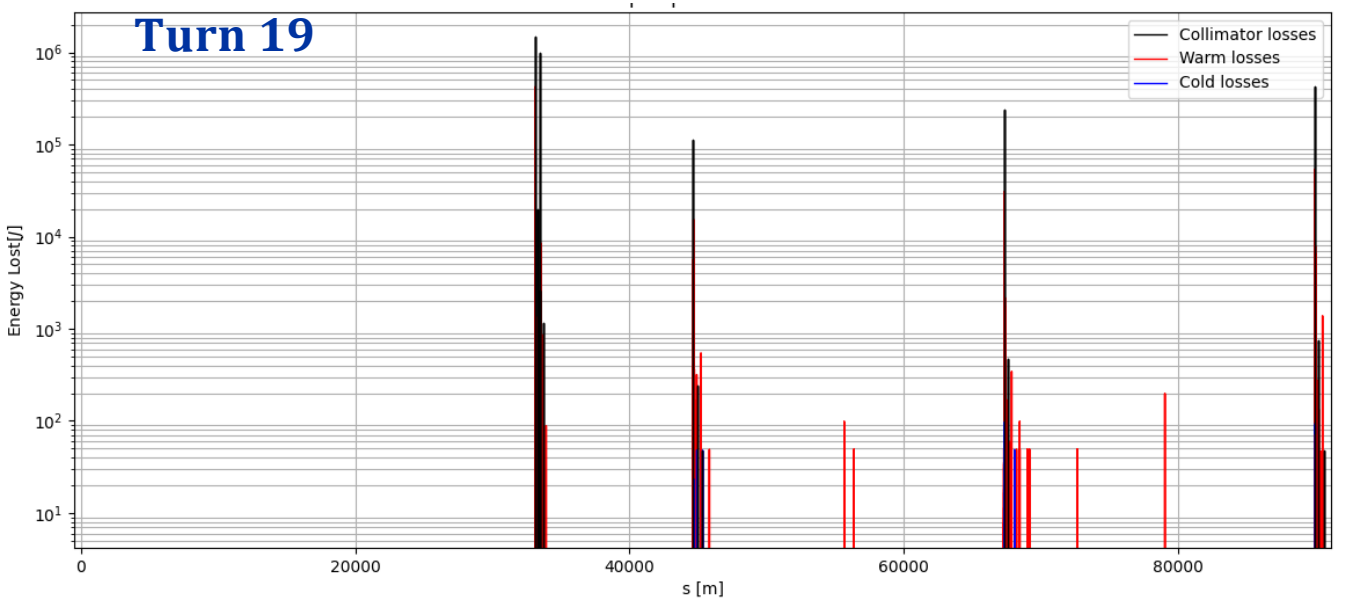


Lossmaps per turn (bin = 10 cm)

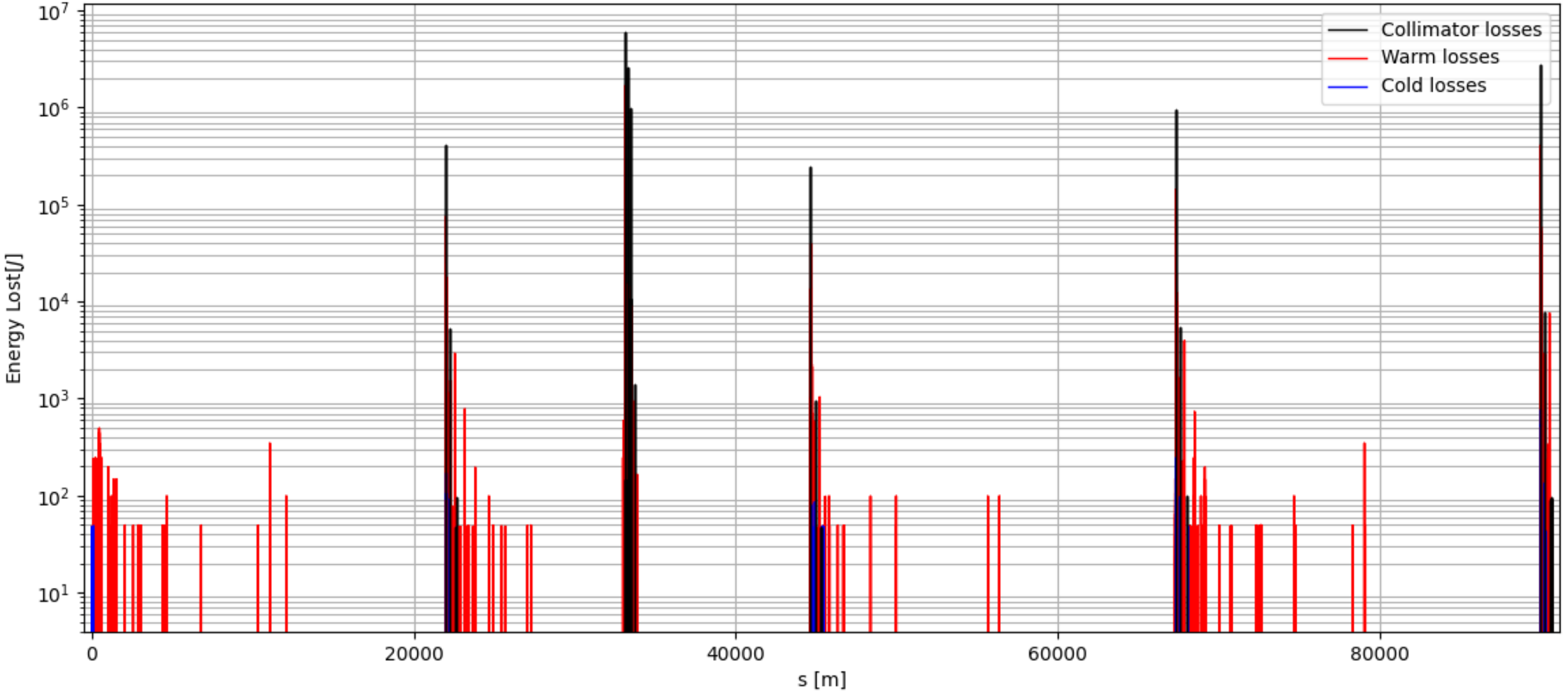




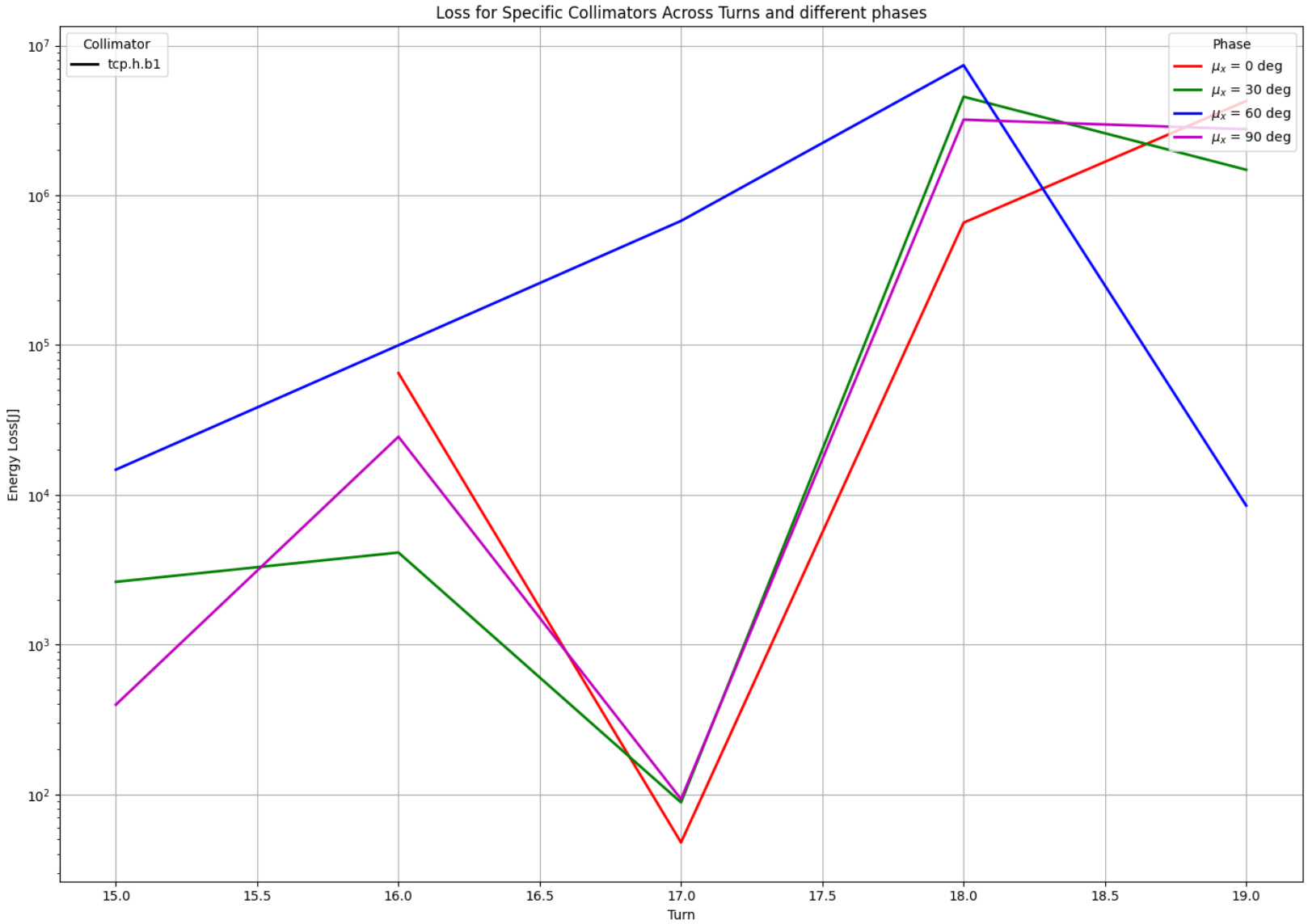
- Most particles are lost at turn 17 and 18
- Relevant losses also at turn 16 and 19
- Energy lost up to turn 16 $\sim 1.8MJ$
- Energy lost up to turn 15 $\sim 6.6K$



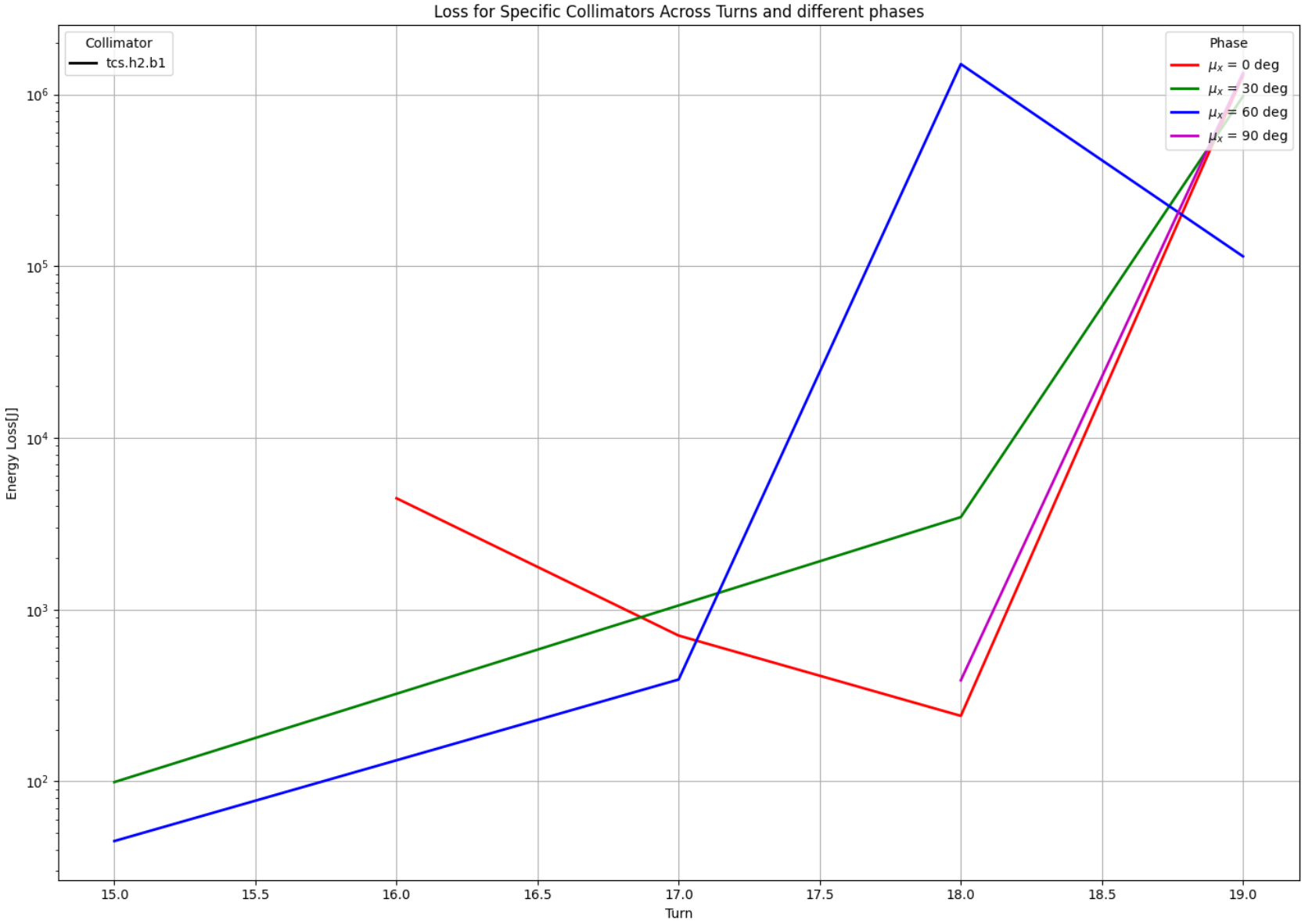
Lossmap all turn in power (bin = 10 cm)



Comparison different phase advances



Comparison different phase advances



Comparison different phase advances