

# **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 $\mu = 0^{\circ}$ wrt TCP.H.B1 6 TURNS RISE TIME – 4.75e5 PARTICLES



#### **Normalized X at TCP.H.B1**

Average  $X_{norm}[\sigma]$  vs Turn



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# **Normalized amplitude at TCP.H.B1**

Amplitude along X vs Turn Number



# 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)

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# Horizontal kick at $\mu = 30^{\circ}$ wrt TCP.H.B1 6 TURNS RISE TIME – 4.75e5 PARTICLES



#### **Normalized X at TCP.H.B1**

Average  $X_{norm}[\sigma]$  vs Turn



# **Normalized amplitude at TCP.H.B1**

Amplitude along X vs Turn Number





# 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 ~ 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**

Loss for Specific Collimators Across Turns and different phases Collimator Phase tcs.h2.b1  $\mu_x = 0 \text{ deg}$ = 30 deg 106  $\mu_x \neq 60 \text{ deg}$  $\mu_x = 90 \text{ deg}$ 10<sup>5</sup> Energy Loss[J] 104 10<sup>3</sup> 10<sup>2</sup> 15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 Turn



#### **Comparison different phase advances**



