Dynamic aperture update

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Acknowledgements:

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Outline

➤ Dynamic aperture (update since FCC week 2017)
  ● Short- and long-term DA
  ● DA with errors

➤ Outlook
1. Dynamic aperture

➤ Compare short- and long-term DA w/o errors

- Short-term (upper, tracking $1024$ turns): colorful dots => survived over 1024 turns
- Long-term (lower, tracking $10^5$ turns): colors scale as survival turns (w/ RF but incorrect settings)

![Graphs showing dynamic aperture comparison](image-url)
1. Dynamic aperture

➤ Compare short- and long-term DA w/o errors

● Short-term (upper, tracking $1024$ turns): colorful dots => survived over $1024$ turns

● Long-term (lower, tracking $10^5$ turns): colors scale as survival turns (w/o RF cavity)
1. Dynamic aperture

➤ Compare short- and long-term DA w/o errors

● Short-term (upper, tracking $10^{24}$ turns): colorful dots => survived over 1024 turns

● Long-term (lower, tracking $10^5$ turns): colors scale as survival turns (w/ RF cavity)
1. Dynamic aperture

➤ Compare short- and long-term DA w/o errors

- Short-term (upper, tracking 1024 turns): colorful dots => survived over 1024 turns
- Long-term (lower, tracking $10^6$ turns): colors scale as survival turns (w/o RF cavity)
1. Dynamic aperture

- Long-term (tracking $10^5$ turns): colors scale as survival turns (w/o RF cavity)
  - upper: $\delta$-x space (with amplitude $dx=dy$)
  - lower: x-y space (with $\delta=0$)
1. Dynamic aperture

➤ Compare short-term DA w/o and w/ systematic errors

- Systematic errors: b3s=+6, b5s=-1 in dipoles
- 20x 90-deg version is more robust against errors?

Latest result from Yuri (including b7s)
2. Summary and outlook

➤ Summary

● DA not sensitive to tracking turns (short-term tracking with FMA well predicts DA?)
● Errors dominate DA

➤ Outlook

● Narrow down choices to 18x 60-deg and 20x 90-deg [Or 18x 90-deg arc (resonance free)?]  
● Need systematic simulations of DA with errors (Tools: SAD, LEGO, MADX/SixTrack)
● [Urgent] Need to prepare MADX toolkits (Full lattice with respects to engineering details, macros for lattice manipulations, simulation tools, etc.)