Multithreaded version of radio - performance & physics

General C8 call 13.10.2022

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Workstation specifications:

- CPU: AMD Ryzen Threadripper 2970WX 24-Core Processor - **48 threads**
  Base clock speed: 3GHz
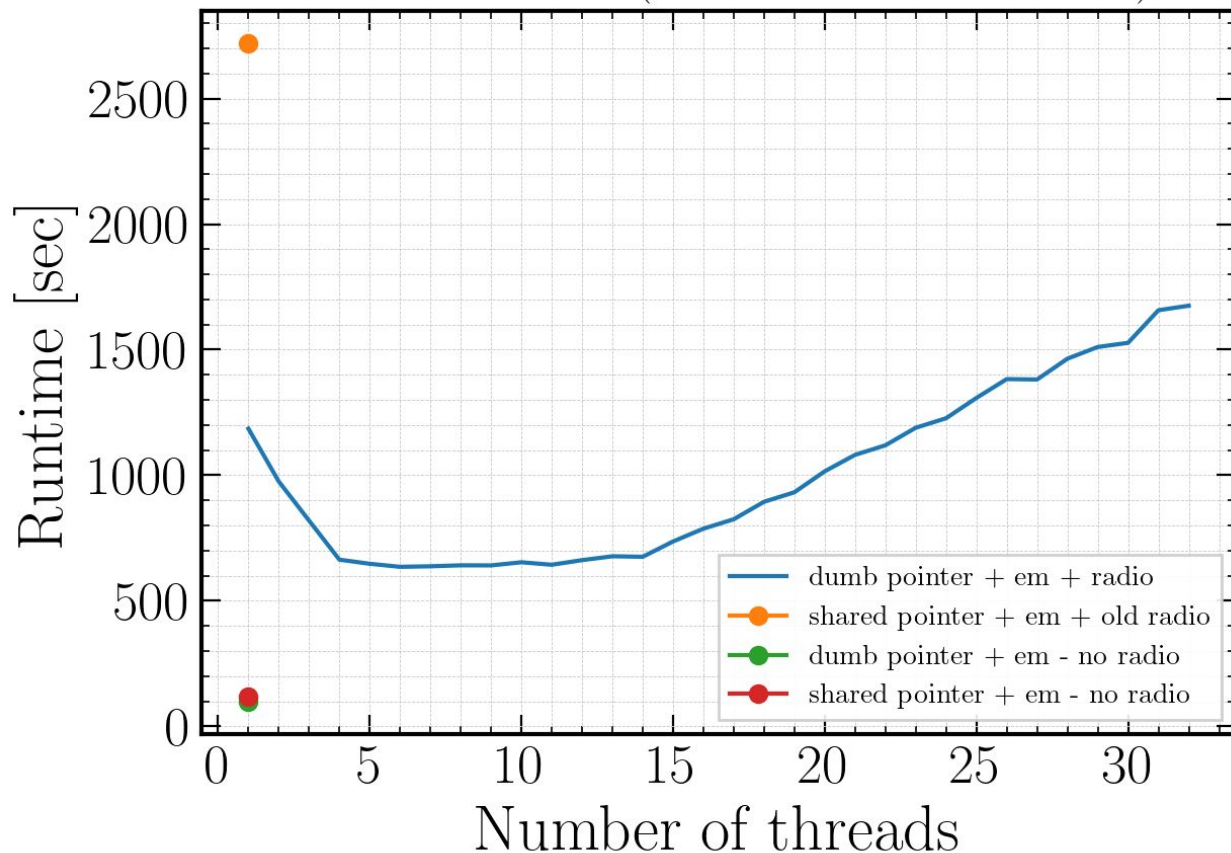 Max clock speed: 4.2GHz
  L3 cache: 64 MB
- RAM memory: 64 GB

Run specifications:

- <u>fork</u>: https://gitlab.iap.kit.edu/AAAlvesJr/corsika-cap
- <u>branch</u>: radio-devel-2
- <u>commit</u>: e0b7cb9bb29c759ad92de75aaa5026a628b570ad
- <u>seed</u>: 2723141261 (only for radio_em_shower.cpp)
- <u>examples</u>: radio_em_shower.cpp & synchrotron_test_manual_tracking.cpp

Runtime of 10 TeV electron induced shower

10 TeV em shower - (160 antennas - 2 formalisms)

Legend:
- dumb pointer + em + radio
- shared pointer + em + old radio
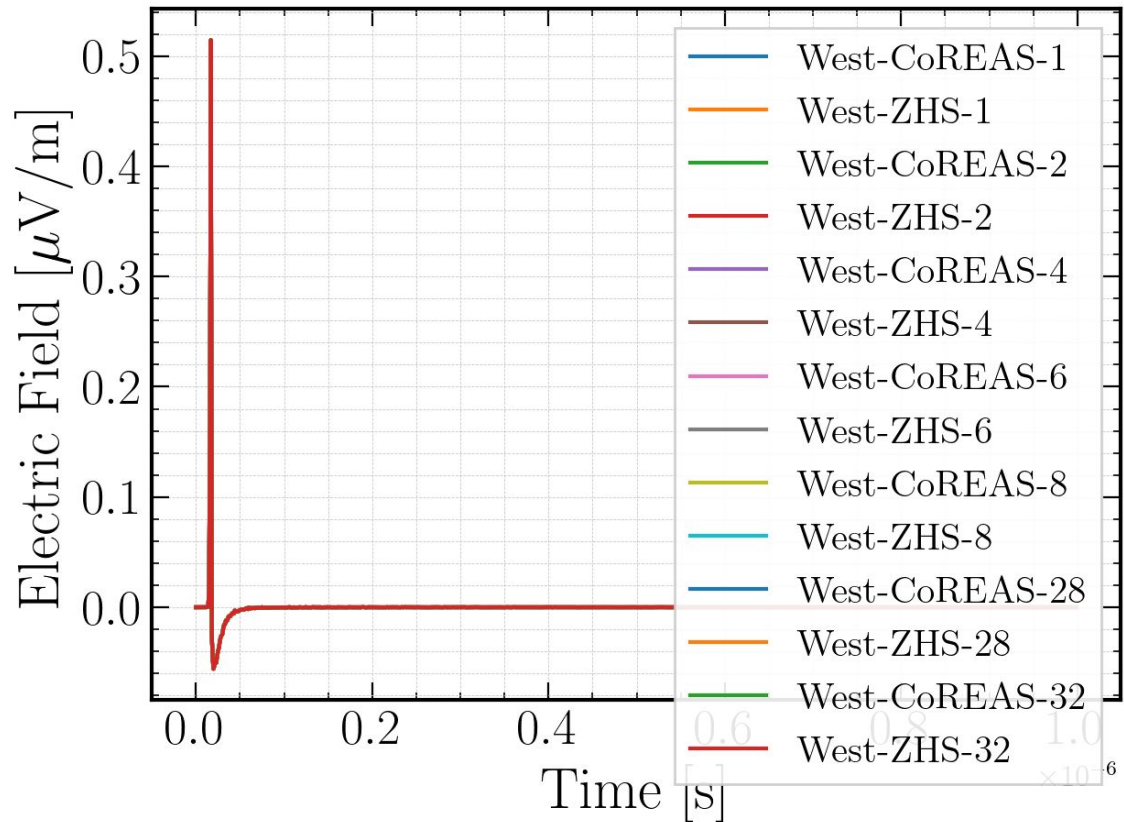- dumb pointer + em - no radio
- shared pointer + em - no radio

- time difference between shared & dumb pointer in pure em shower with no radio included is 20 seconds - the same version of PROPOSAL was used, i.e 7.4.2. This shared pointer might be a hot candidate for our performance drain.

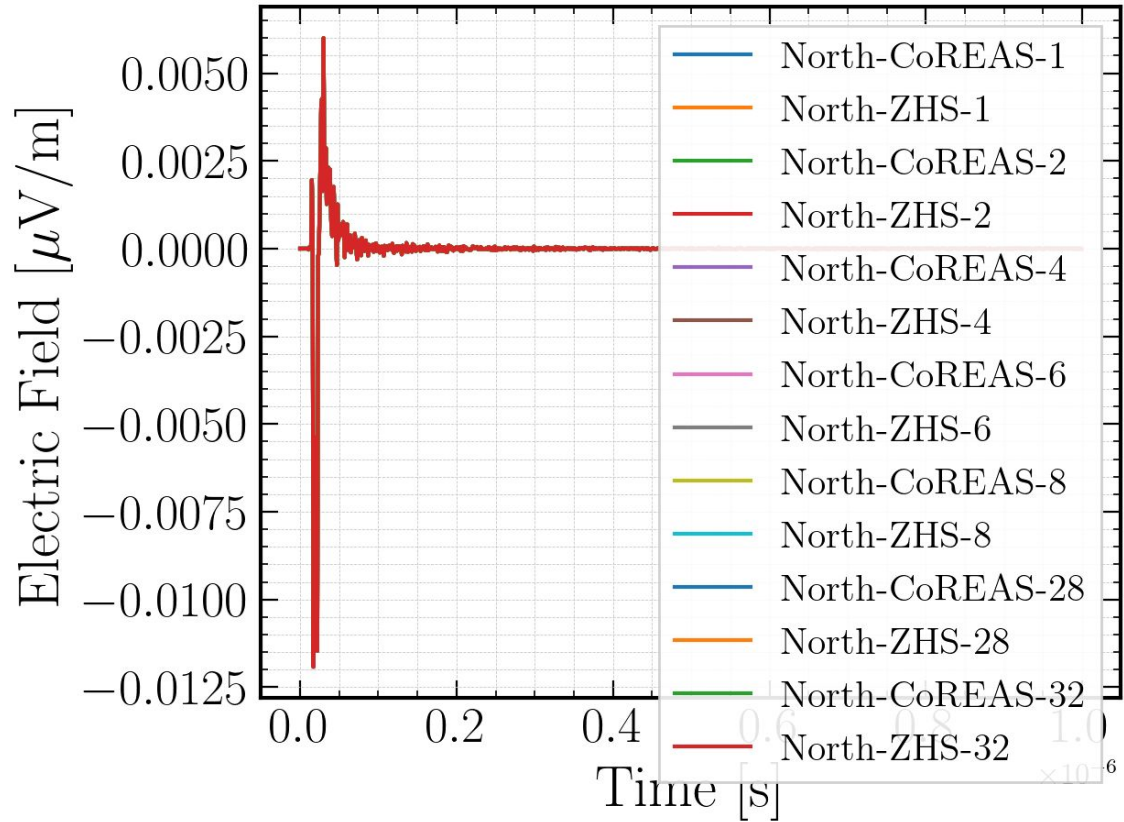# Check that multithreading does not interfere with physics results

- Antenna at 200m - 10TeV em shower -

# Check that multithreading does not interfere with physics results

- Antenna at 200m - 10TeV em shower -

Legend:
North-CoREAS-1
North-ZHS-1
North-CoREAS-2
North-ZHS-2
North-CoREAS-4
North-ZHS-4
North-CoREAS-6
North-ZHS-6
North-CoREAS-8
North-ZHS-8
North-CoREAS-28
North-ZHS-28
North-CoREAS-32
North-ZHS-32

Check that multithreading does not interfere with physics results

- Antenna at 200m - 10TeV em shower -

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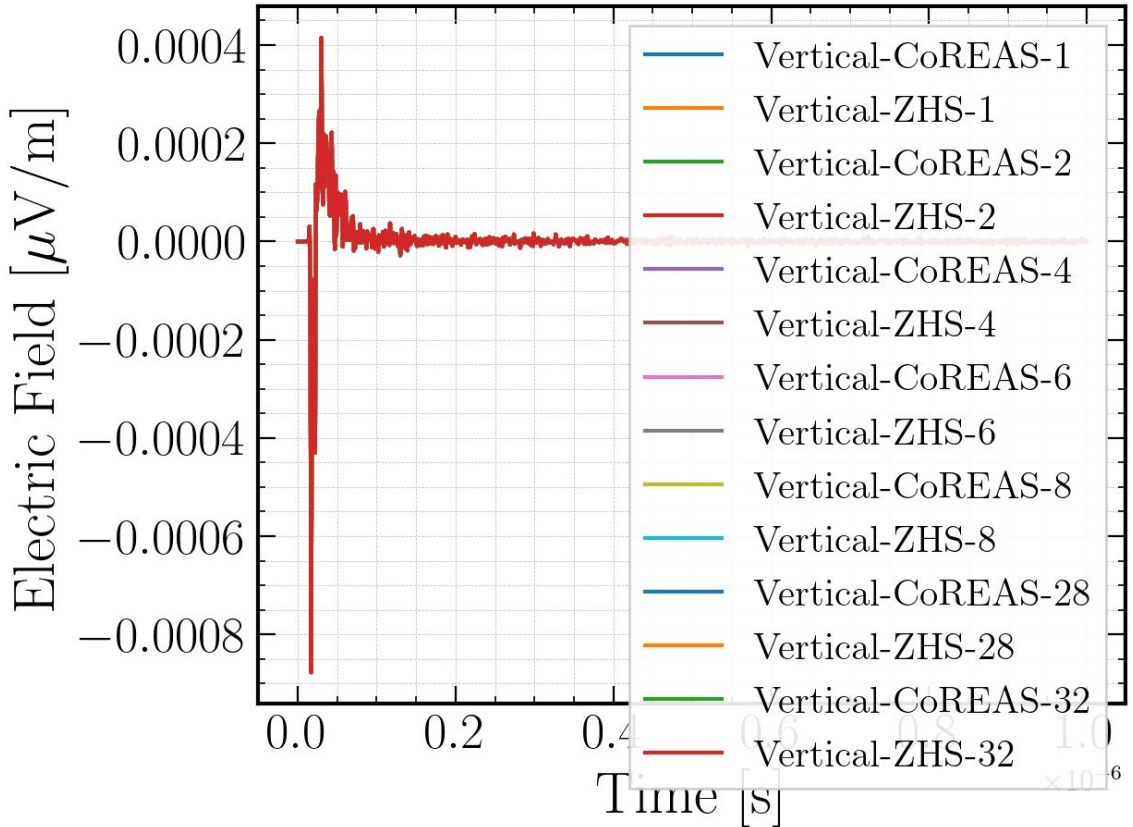
Synchrotron emission of an electron orbiting around a circular track
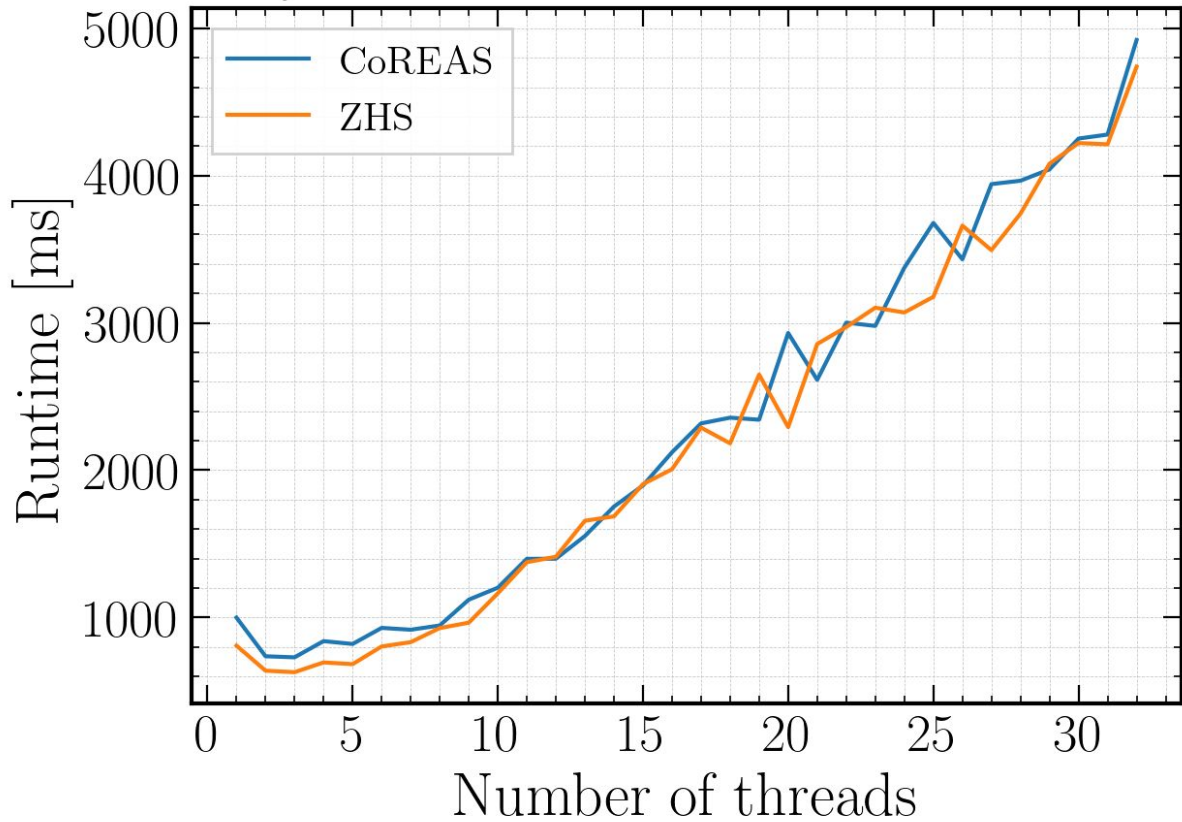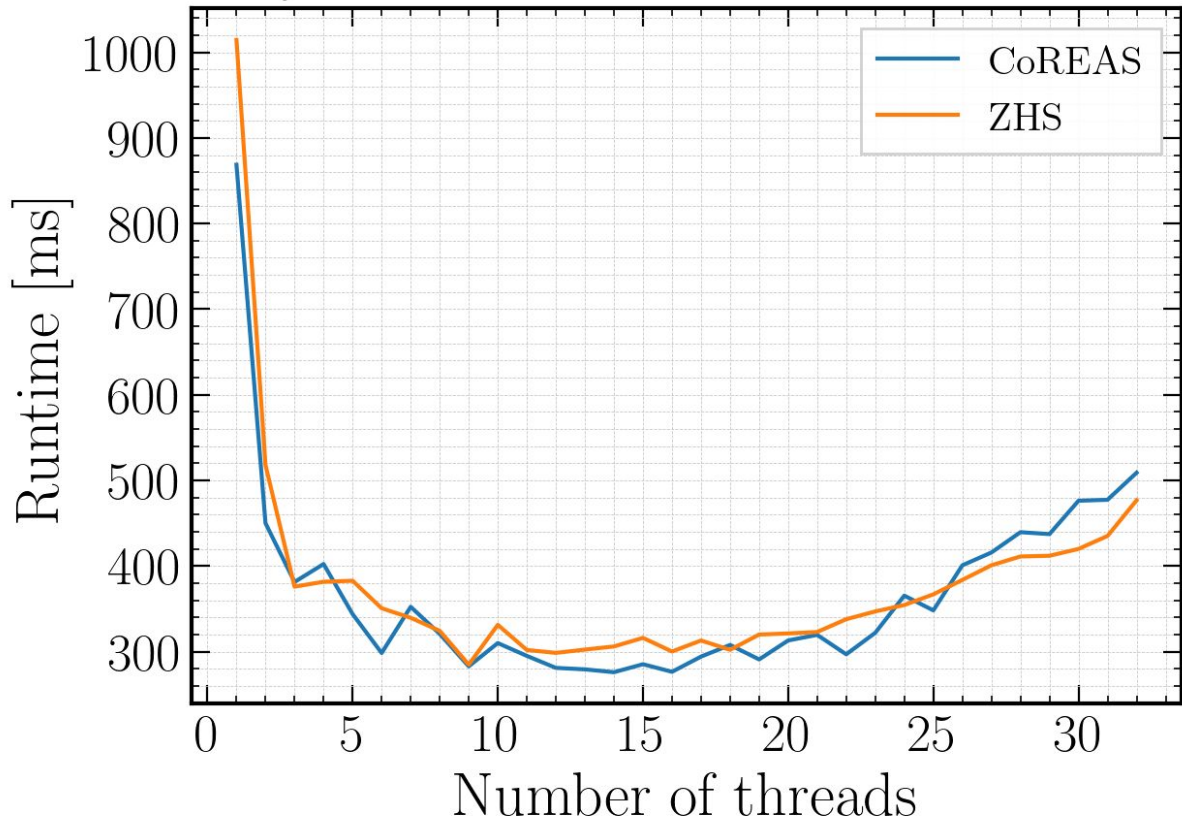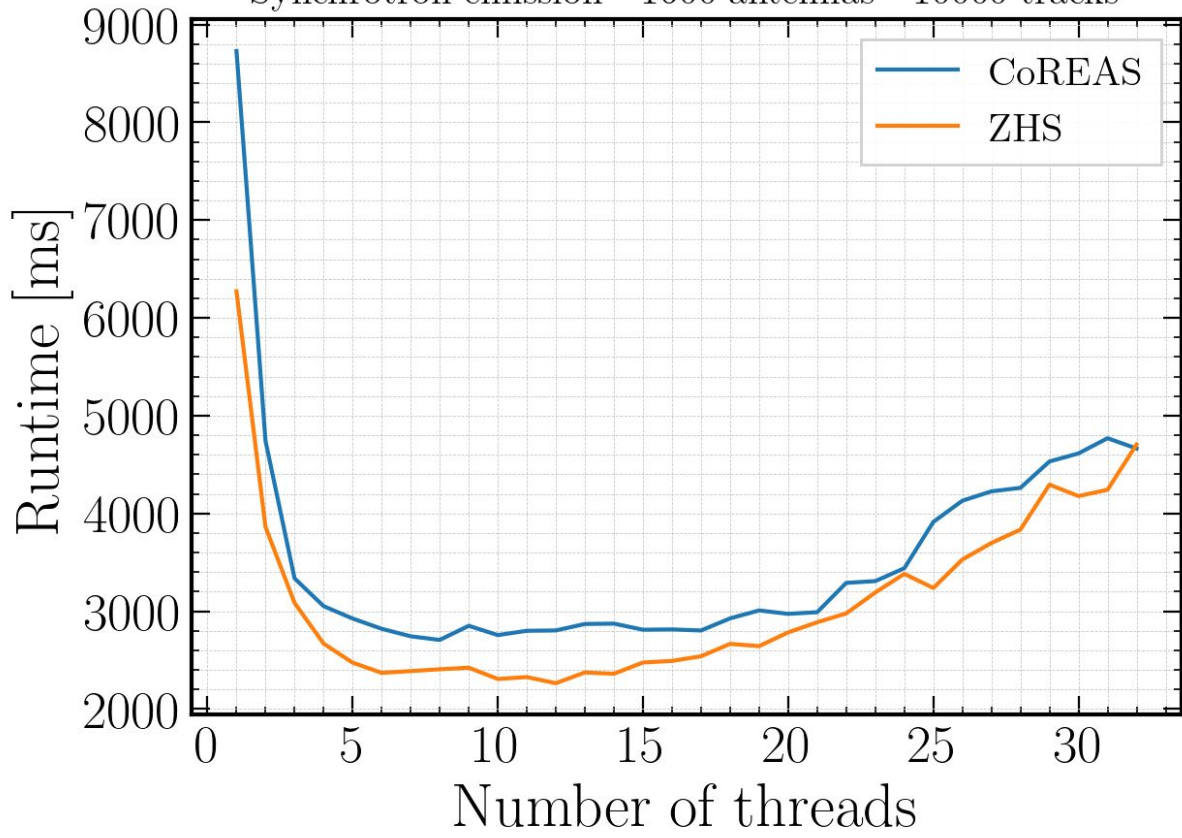
Synchrotron emission - 160 antennas - 1000 tracks
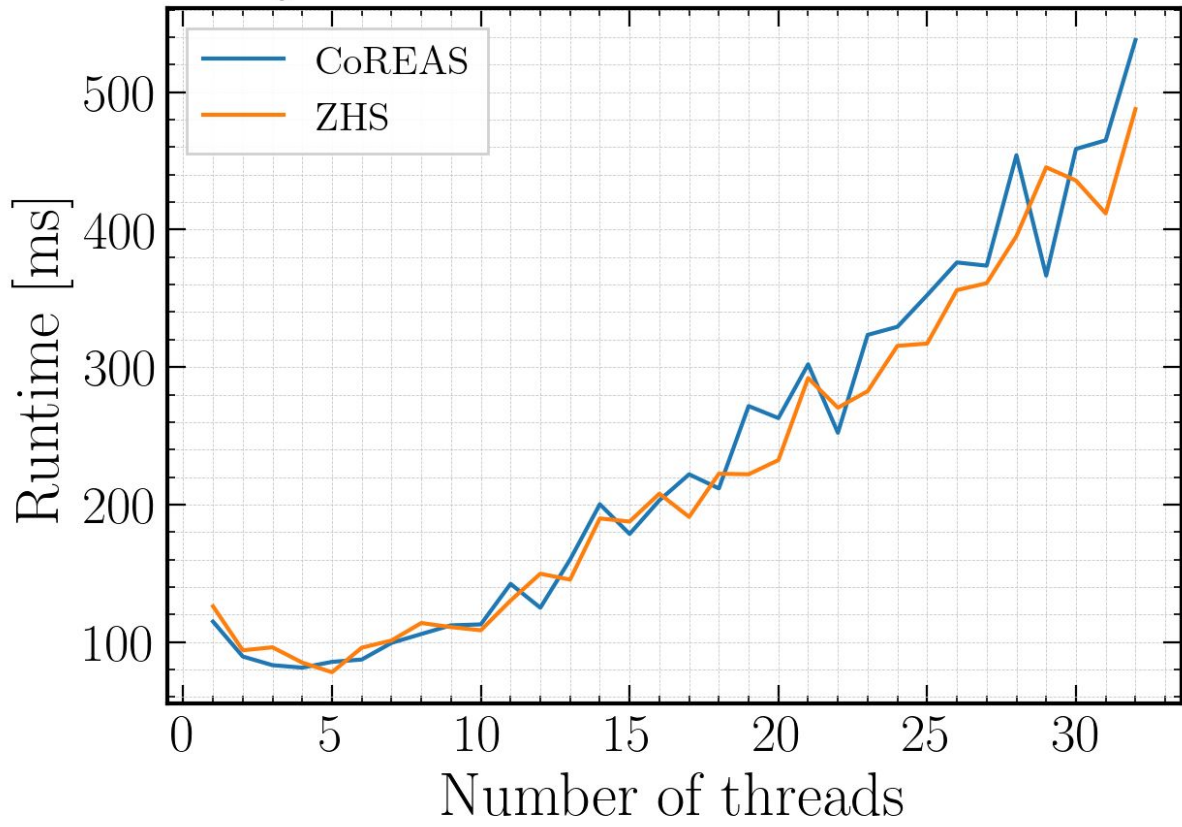
Synchrotron emission of an electron orbiting around a circular track

Synchrotron emission - 160 antennas - 10000 tracks

Synchrotron emission of an electron orbiting around a circular track

Synchrotron emission - 1600 antennas - 1000 tracks

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Synchrotron emission of an electron orbiting around a circular track

Synchrotron emission - 1600 antennas - 10000 tracks

Thank you!