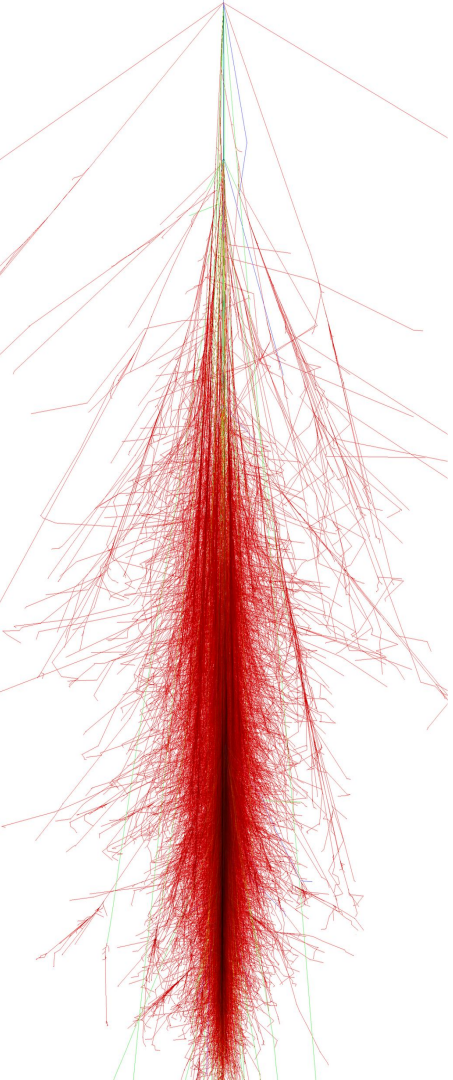


# Radio updates

10.02.2022

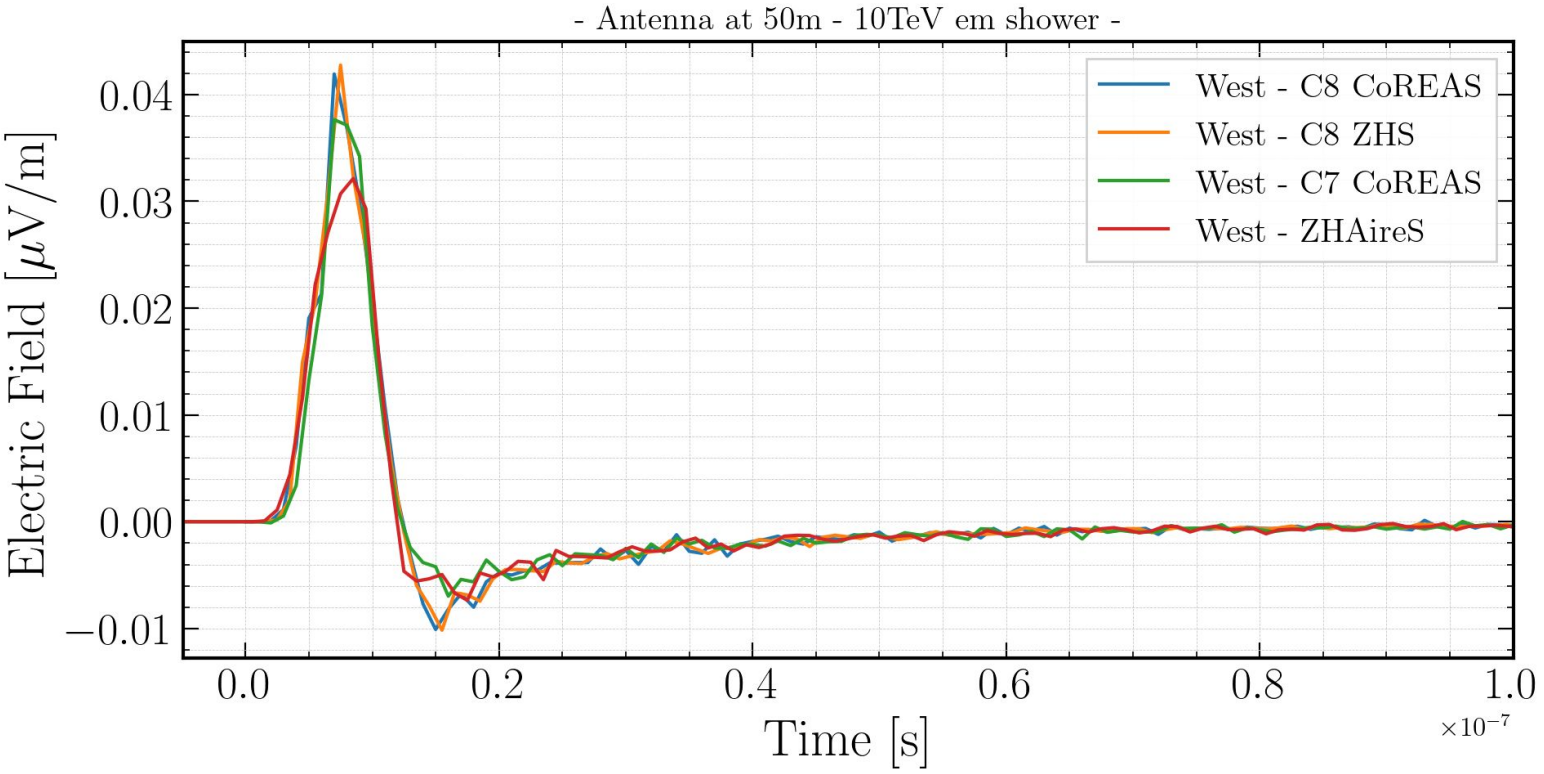
Nikos Karastathis

KIT

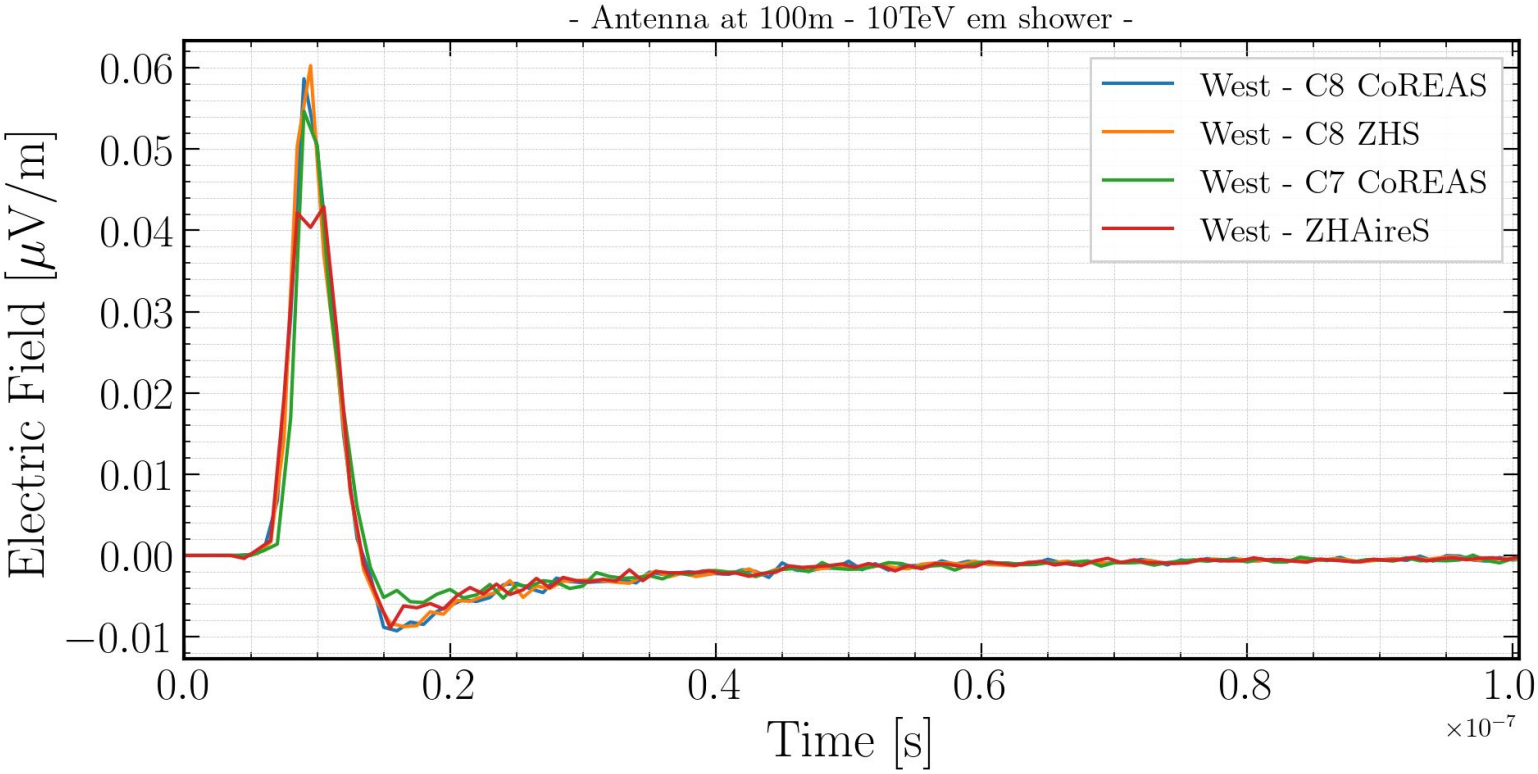
# What is the current status of work?

- Validation and testing of PROPOSAL (v. 7.2.1)
- We are looking into Cascade.inl as we noticed changes in our pulses when doing changes.
- We notice a bipolar structure of the pulse in charge excess.
- We "slice up" the shower and look at the pulses at different grammage values for electrons and positrons separately, but also combined.
- The issue seems to be present in all pulses from different stages of the shower development.
- Re-architecture of radio output so it can be merged.

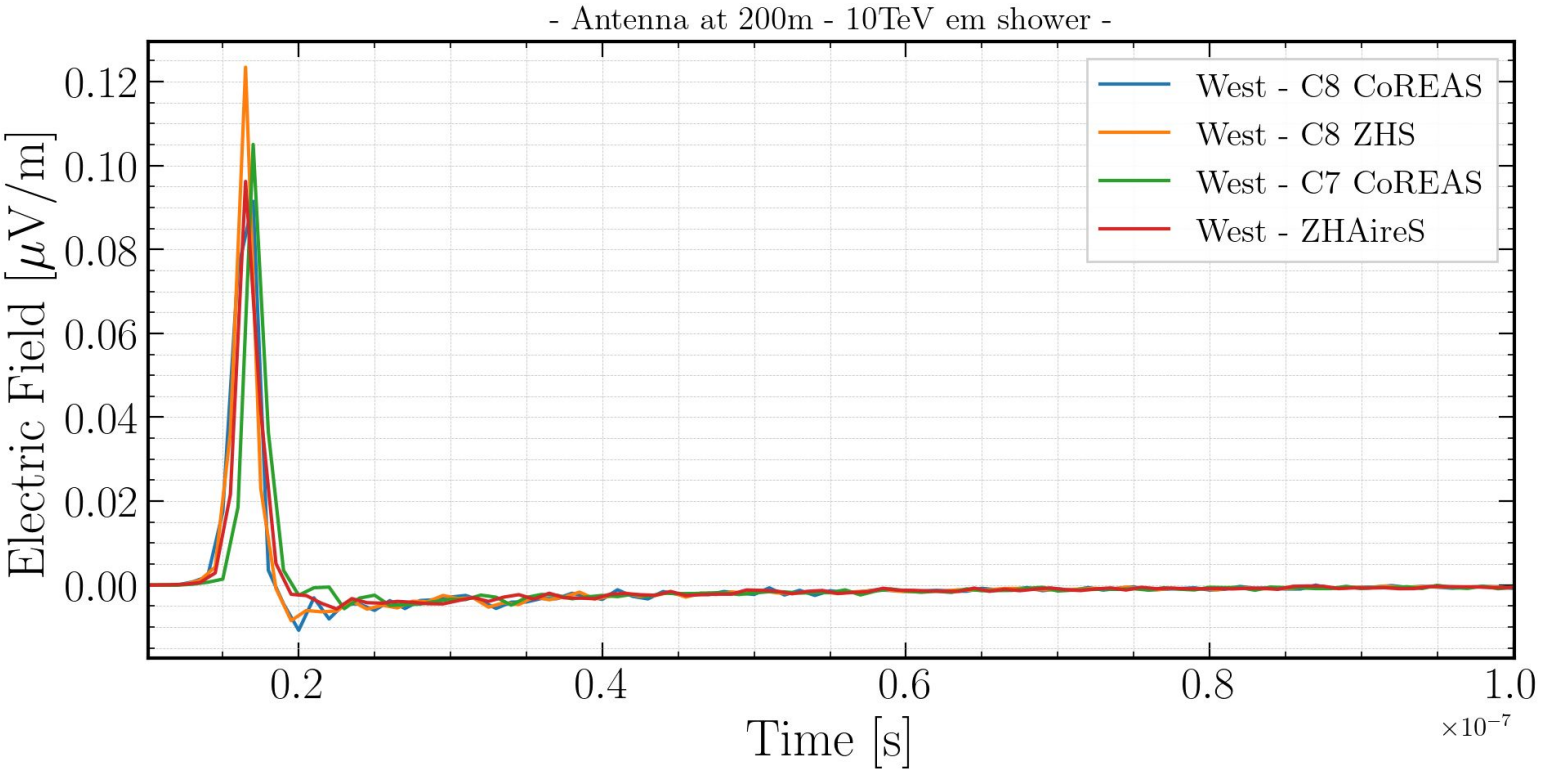
# C8 validation



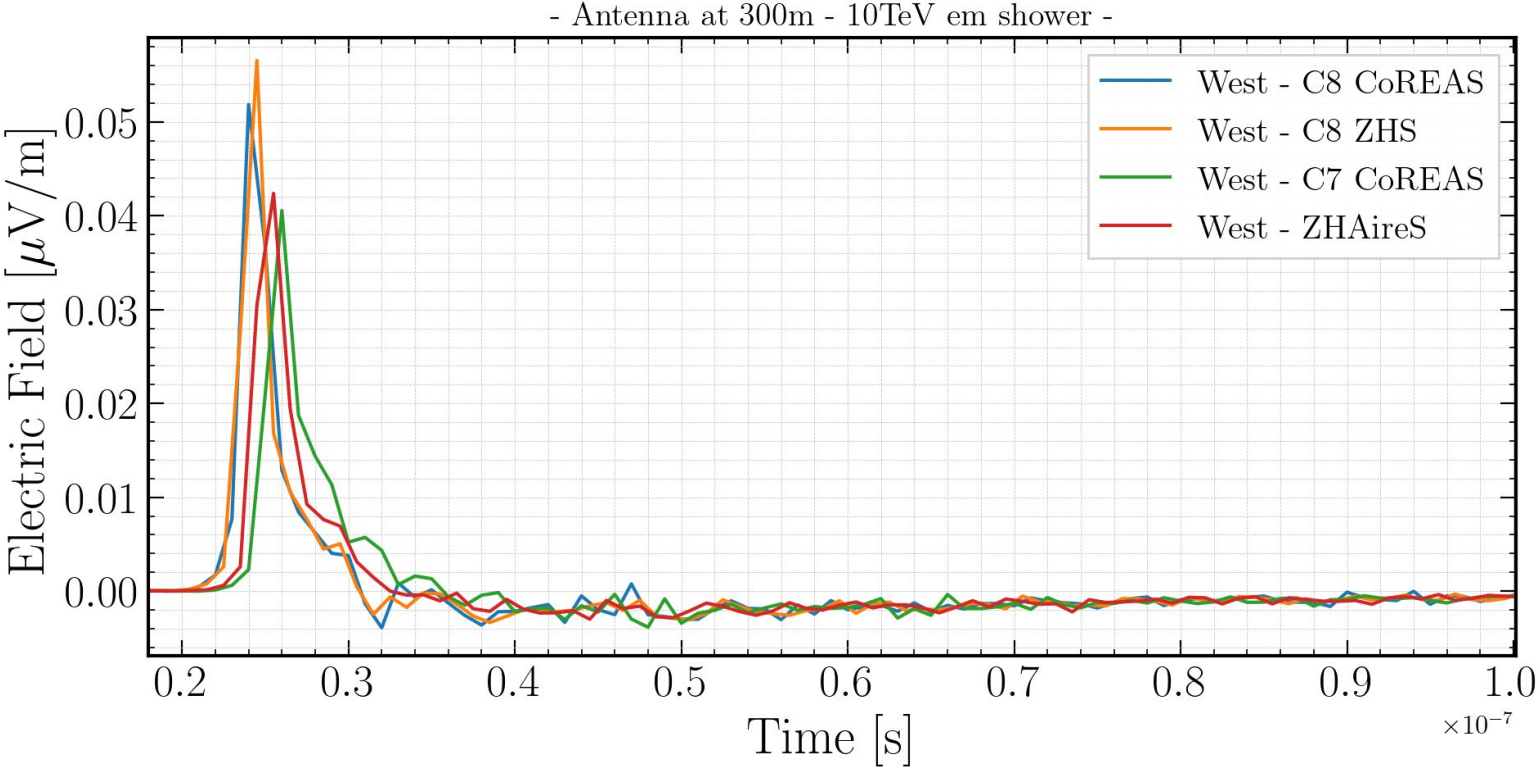
# C8 validation



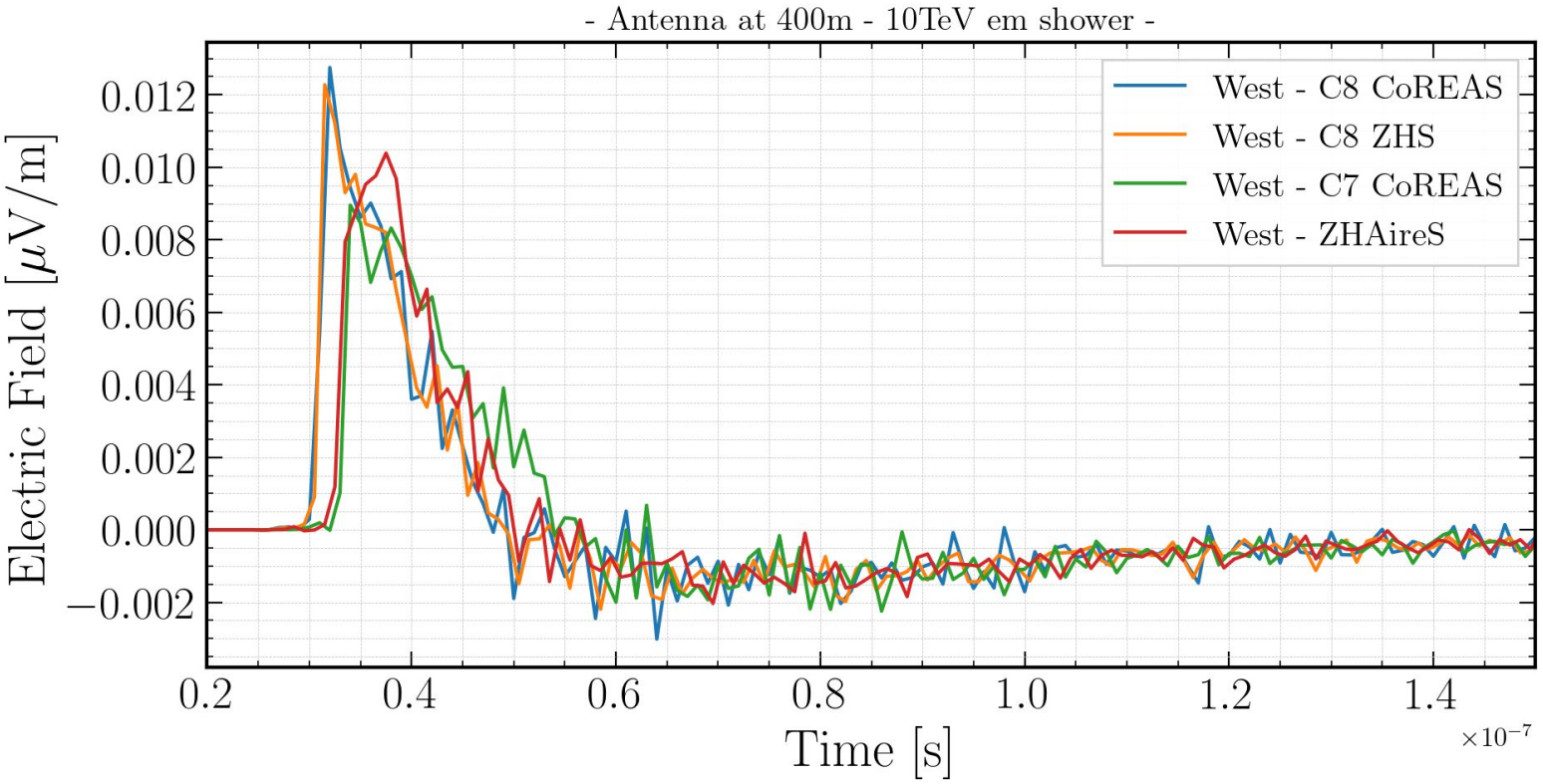
# C8 validation



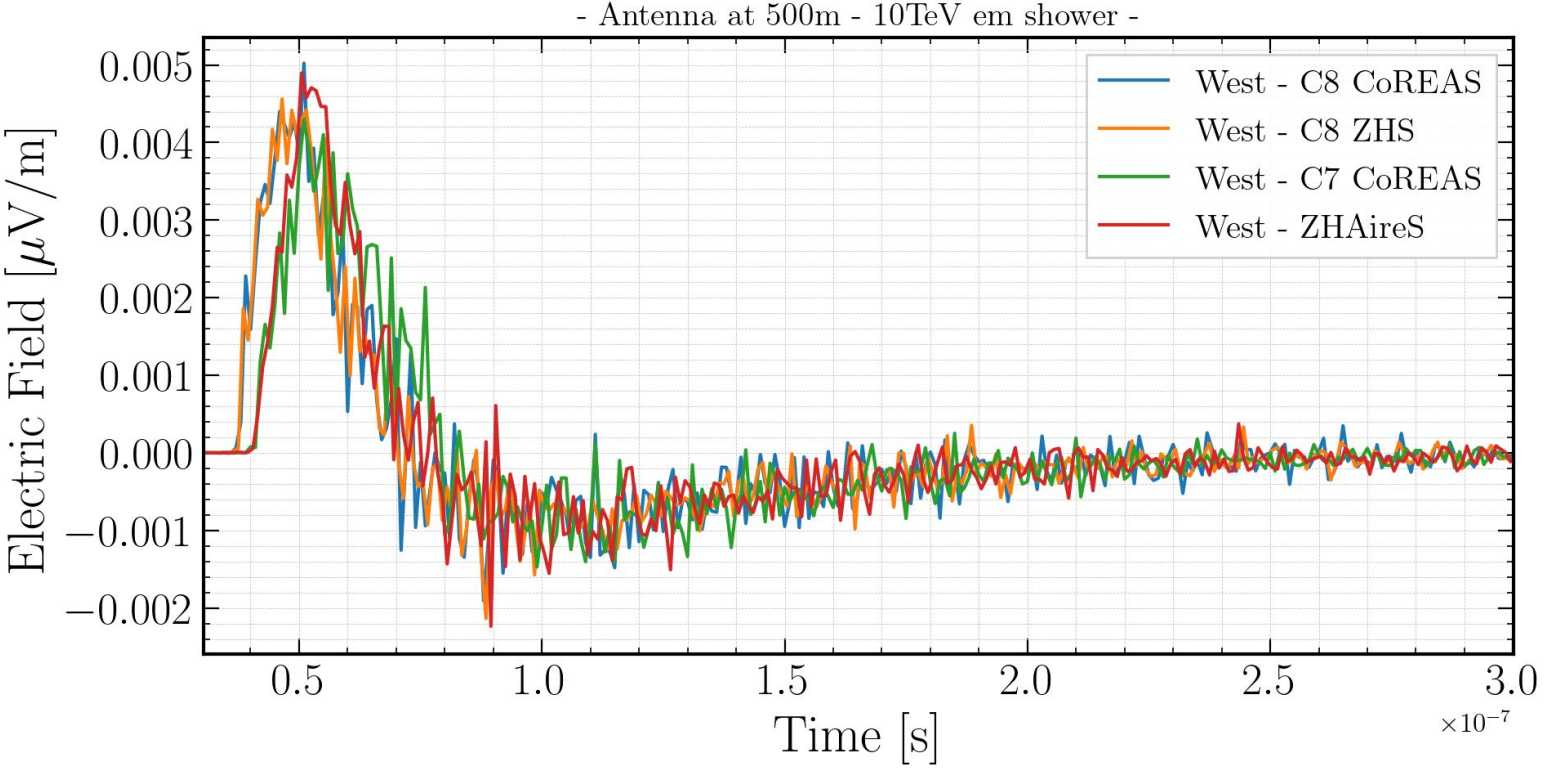
# C8 validation

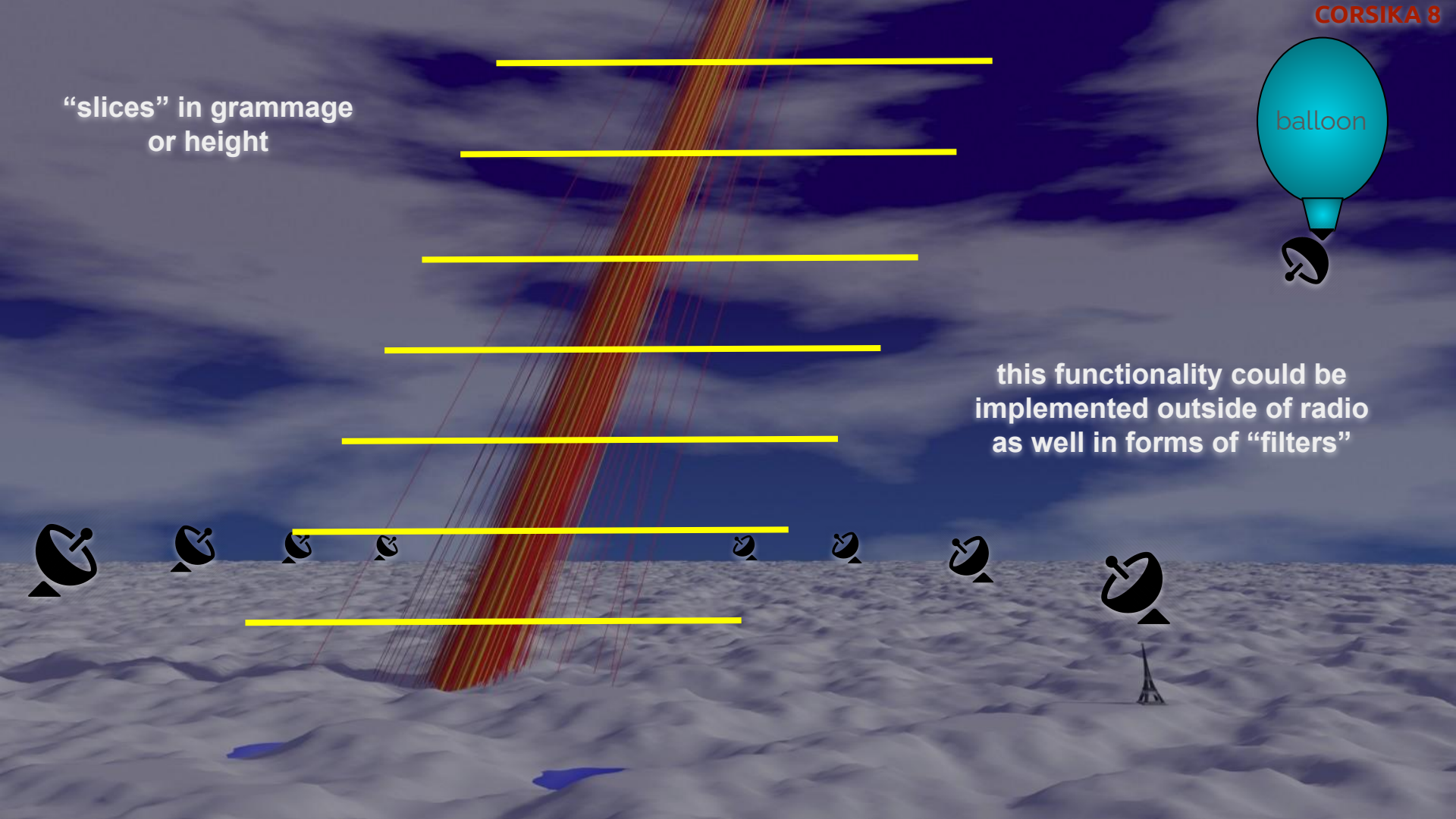


# C8 validation

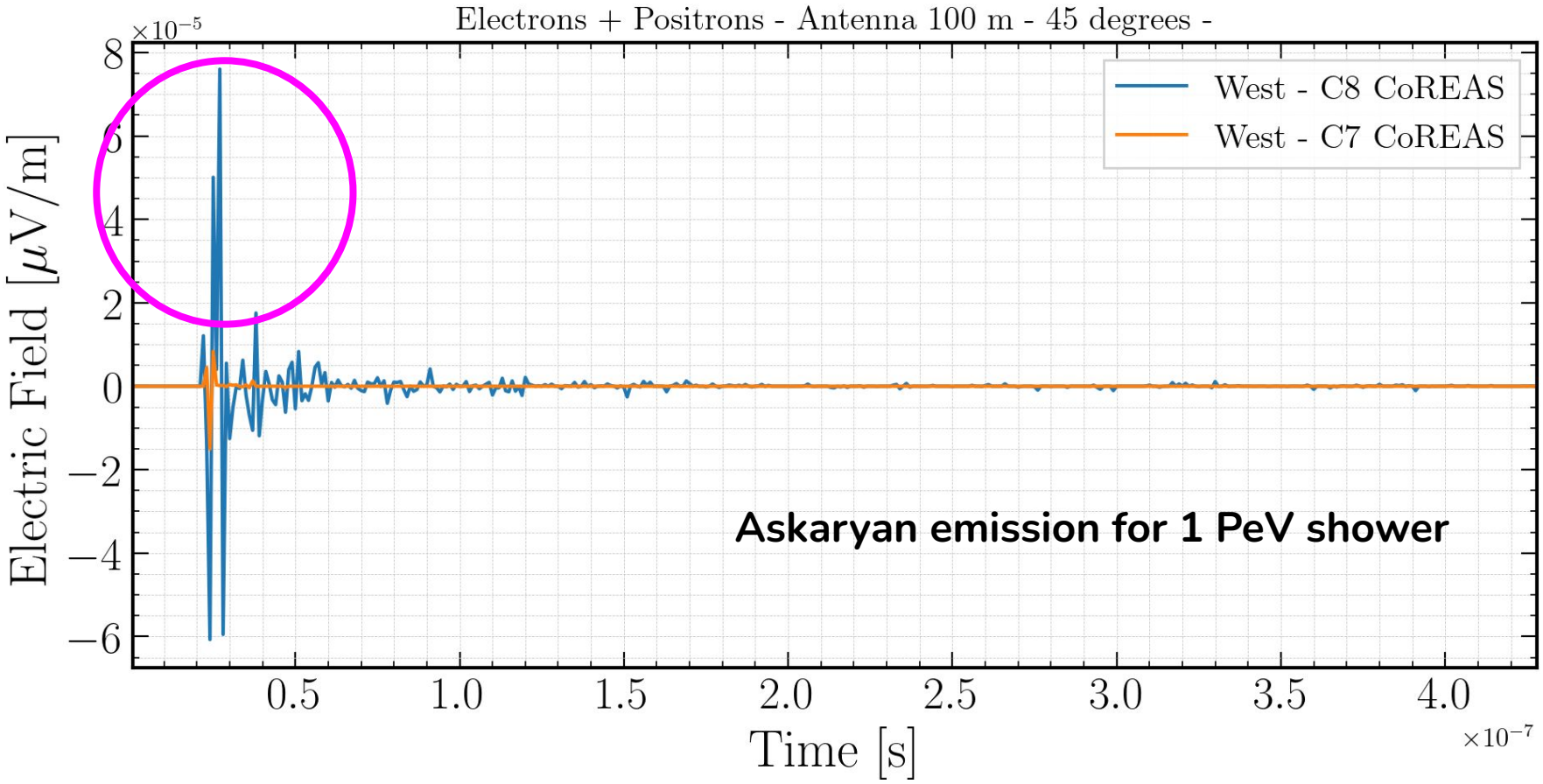


# C8 validation

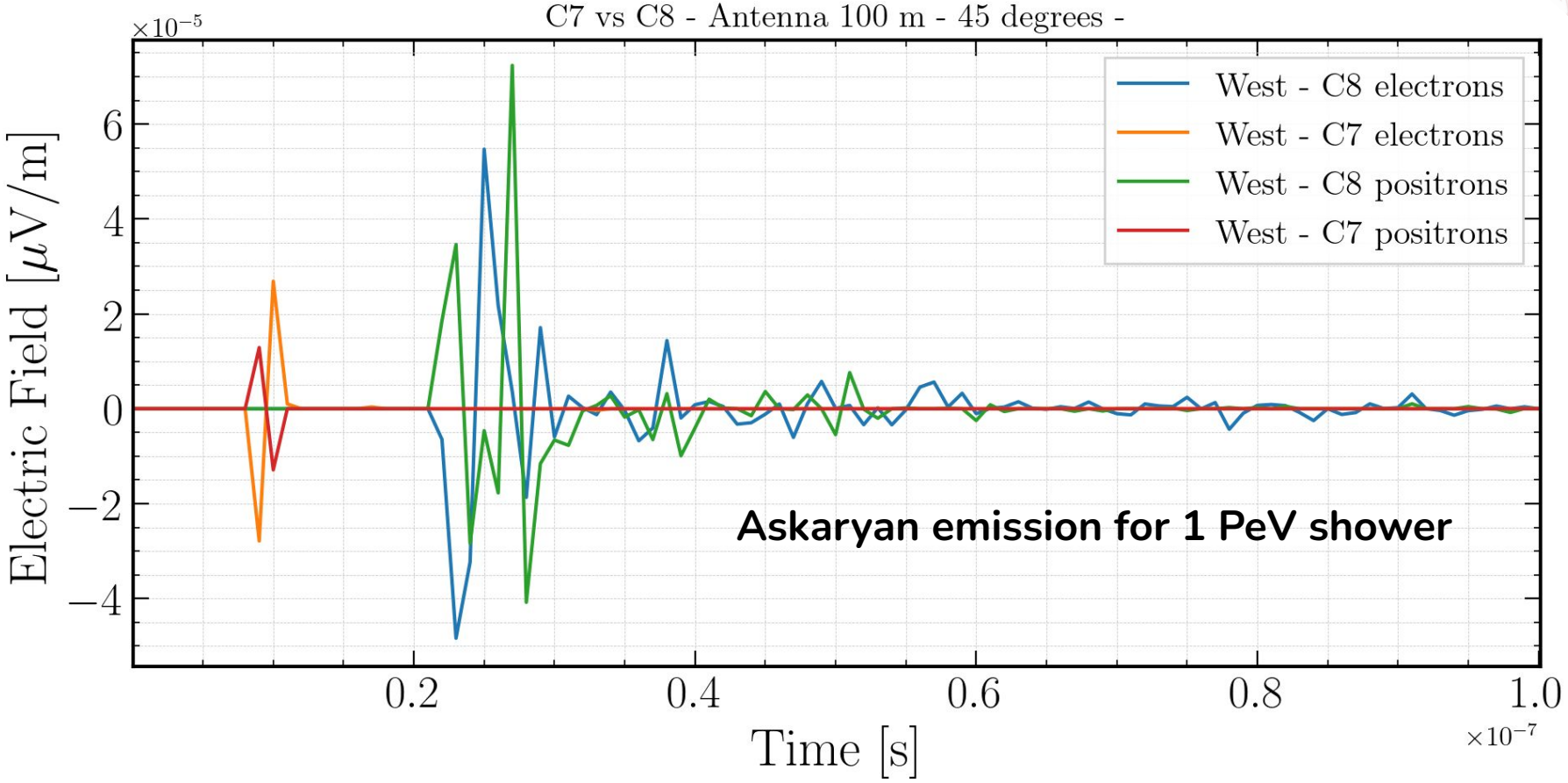



CORSIKA 8
“slices” in grammage or height
balloon
this functionality could be implemented outside of radio as well in forms of “filters”

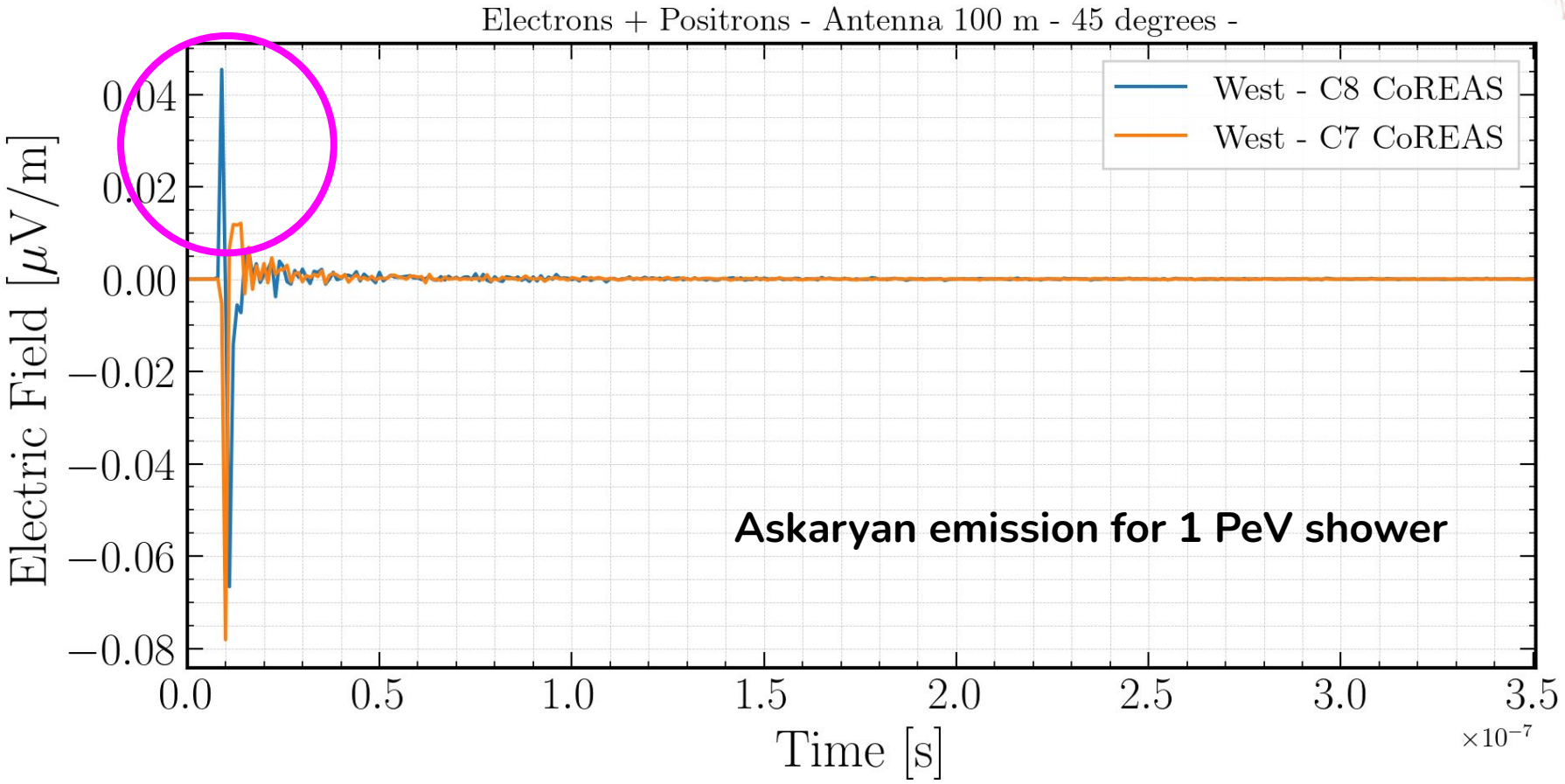
# 0 - 50 g / cm^(2)


Electrons + Positrons - Antenna 100 m - 45 degrees -
×10⁻⁵
8
6
4
2
0
−2
−4
−6
Electric Field [μV/m]
West - C8 CoREAS
West - C7 CoREAS
Askaryan emission for 1 PeV shower
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
×10⁻⁷
Time [s]

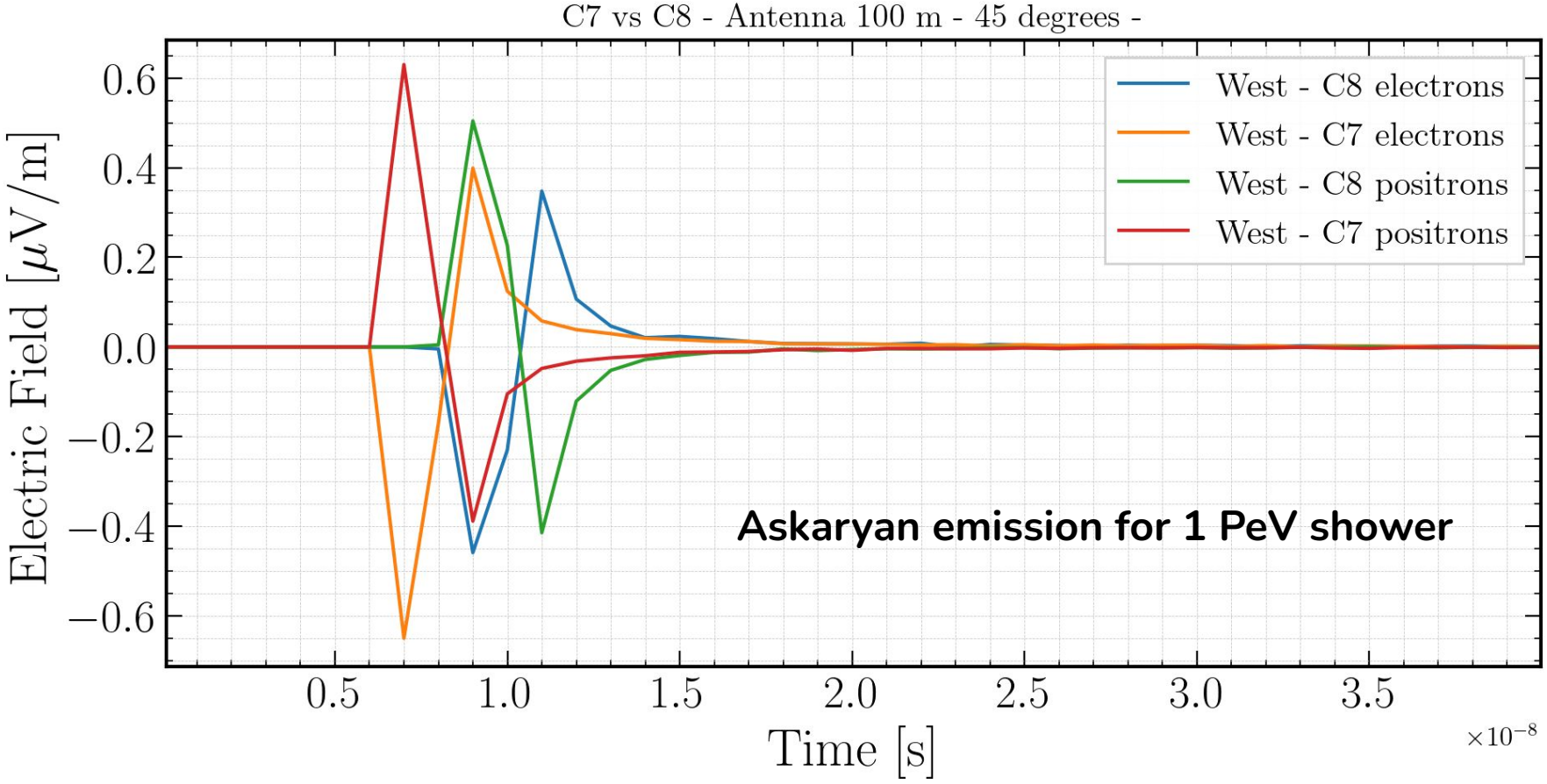
# 0 - 50 g / cm^(2)


C7 vs C8 - Antenna 100 m - 45 degrees -
×10⁻⁵
Electric Field [μV/m]
6
4
2
0
−2
−4
0.2
0.4
0.6
0.8
1.0
Time [s]
×10⁻⁷
West - C8 electrons
West - C7 electrons
West - C8 positrons
West - C7 positrons
Askaryan emission for 1 PeV shower

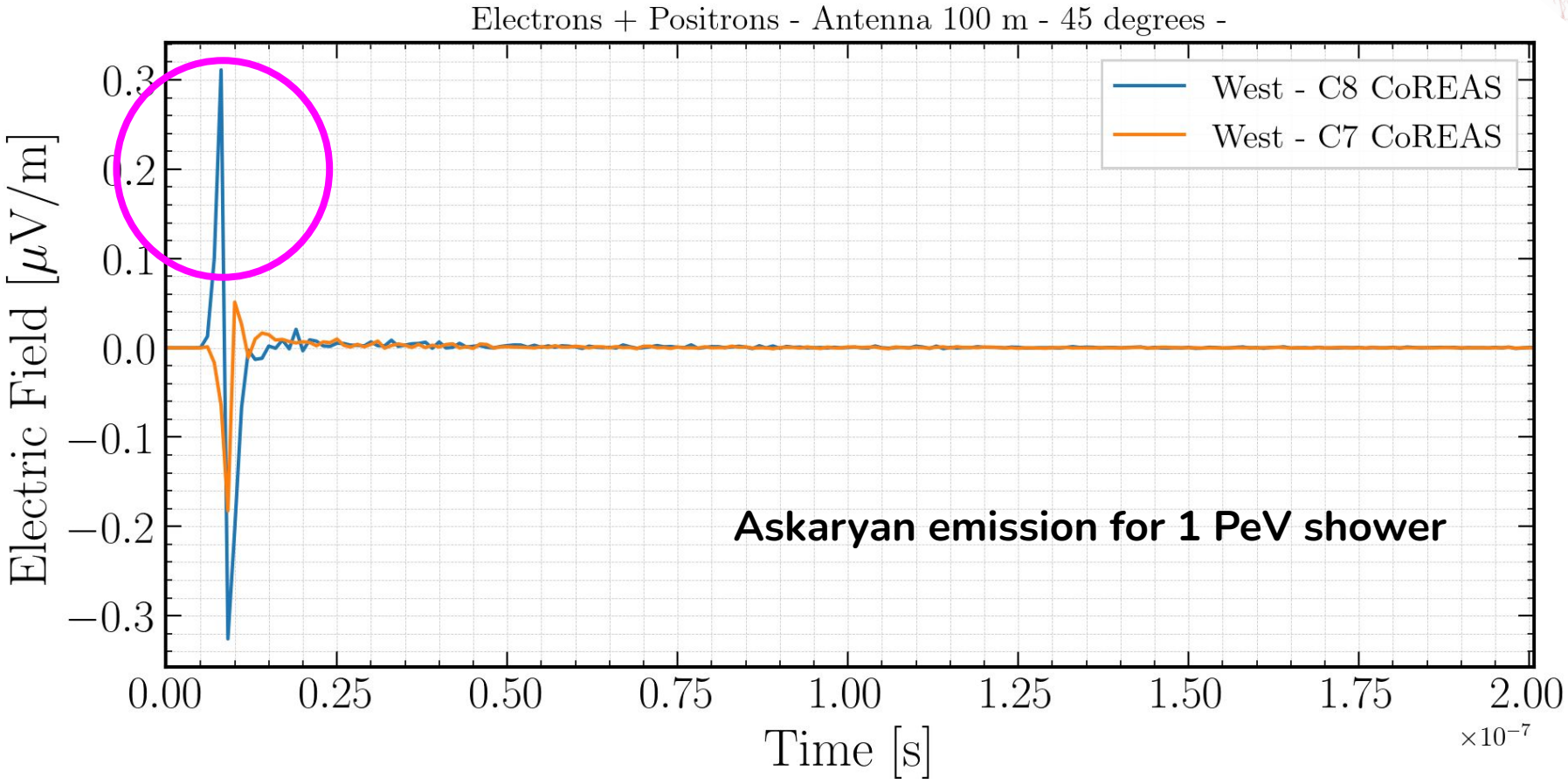
# 400 - 450 g / cm^(2)


Electrons + Positrons - Antenna 100 m - 45 degrees -
West - C8 CoREAS
West - C7 CoREAS
Electric Field [μV/m]
0.04
0.02
0.00
−0.02
−0.04
−0.06
−0.08
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
Time [s]
×10⁻⁷
Askaryan emission for 1 PeV shower

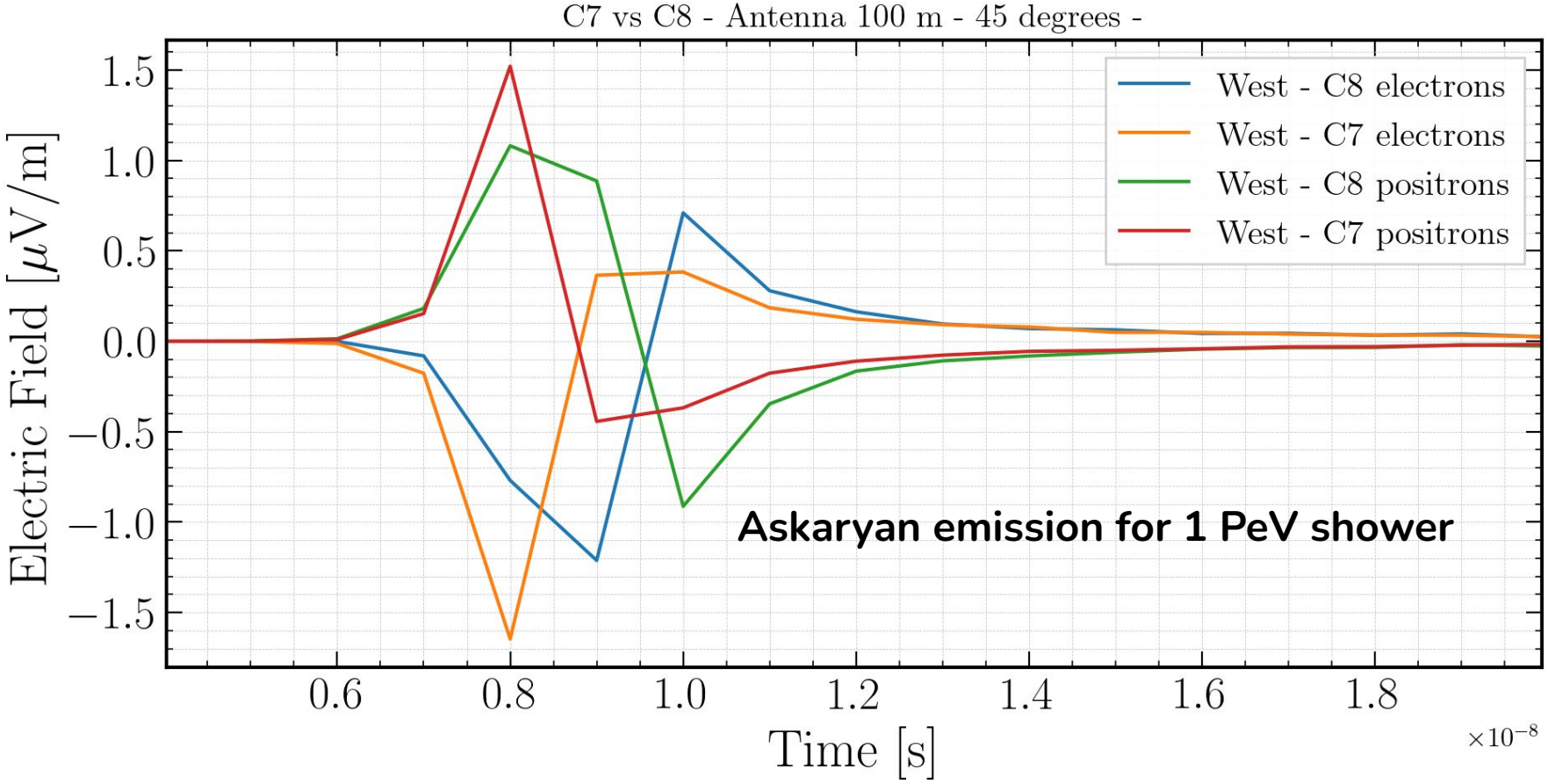
# 400 - 450 g / cm^(2)


C7 vs C8 - Antenna 100 m - 45 degrees -
West - C8 electrons
West - C7 electrons
West - C8 positrons
West - C7 positrons
Askaryan emission for 1 PeV shower
Electric Field [μV/m]
Time [s]
×10⁻⁸
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6
0.5
1.0
1.5
2.0
2.5
3.0
3.5

# 700 - 750 g / cm^(2)


Electrons + Positrons - Antenna 100 m - 45 degrees -
West - C8 CoREAS
West - C7 CoREAS
Electric Field [μV/m]
0.3
0.2
0.1
0.0
−0.1
−0.2
−0.3
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
Time [s]
×10⁻⁷
Askaryan emission for 1 PeV shower

# 700 - 750 g / cm^(2)


C7 vs C8 - Antenna 100 m - 45 degrees -
West - C8 electrons
West - C7 electrons
West - C8 positrons
West - C7 positrons
Askaryan emission for 1 PeV shower
Electric Field [μV/m]
Time [s]
×10⁻⁸
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.6
0.8
1.0
1.2
1.4
1.6
1.8

- Check if indeed something is off with the positron pulse or the positrons in general.
- Redo these plots with higher sampling rate to eliminate that something goes wrong due to time being discretized incorrectly.
- Go through Cascade.inl.
- Do some further analysis on electron and positron pulses (add them together and check the time delays on the start of the signal).

# Thank you!