Update on ImPACT with ctapipe

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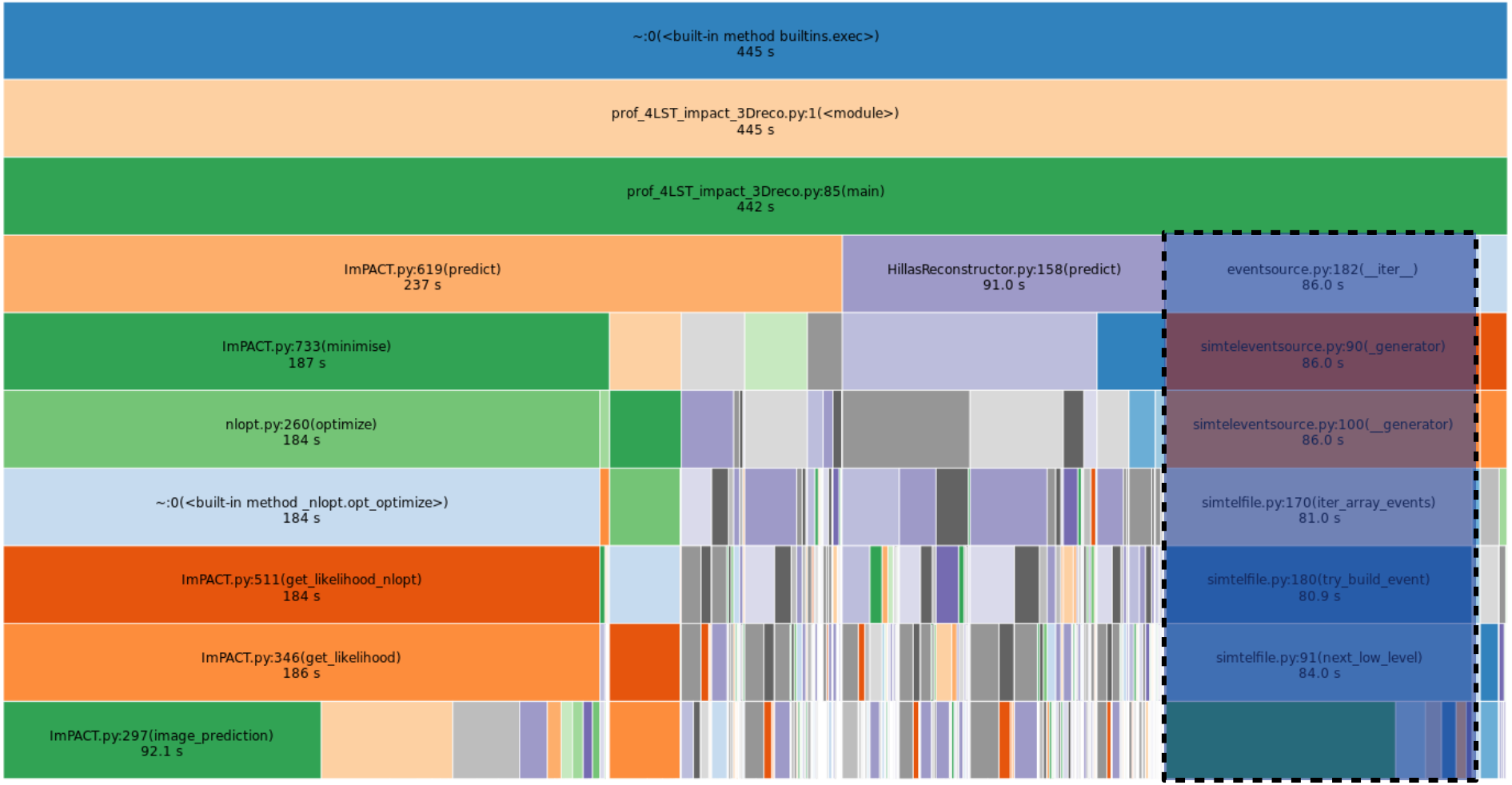
To-do list

- I had to move from the 2D reconstruction method to the 3D method present in ctapipe. A bit of cleaning to the pipeline…
- 3D method as seed to ImPACT since it gives better performances with respect to the 2D.
- Clean-up and speed-up of ImPACT (PR #946):
  - Goal: speed-up ImPACT.
  - How: profile & check results at each “optimization step”

Final goal:

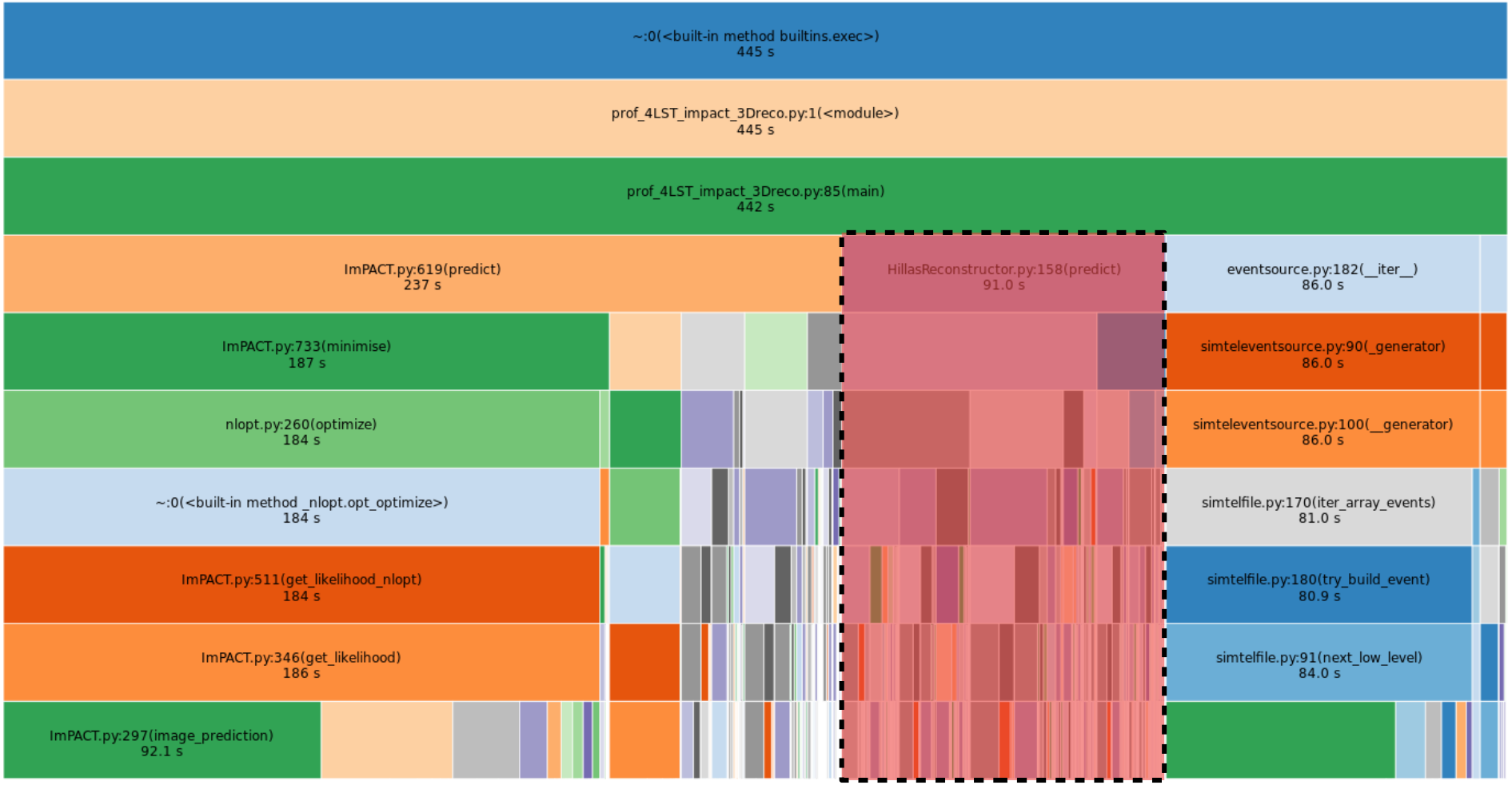
- Move ImPACT to GPU thanks to pytorch
- Not an easy task but this would offer the speed-up together with good physical performances

The profiling



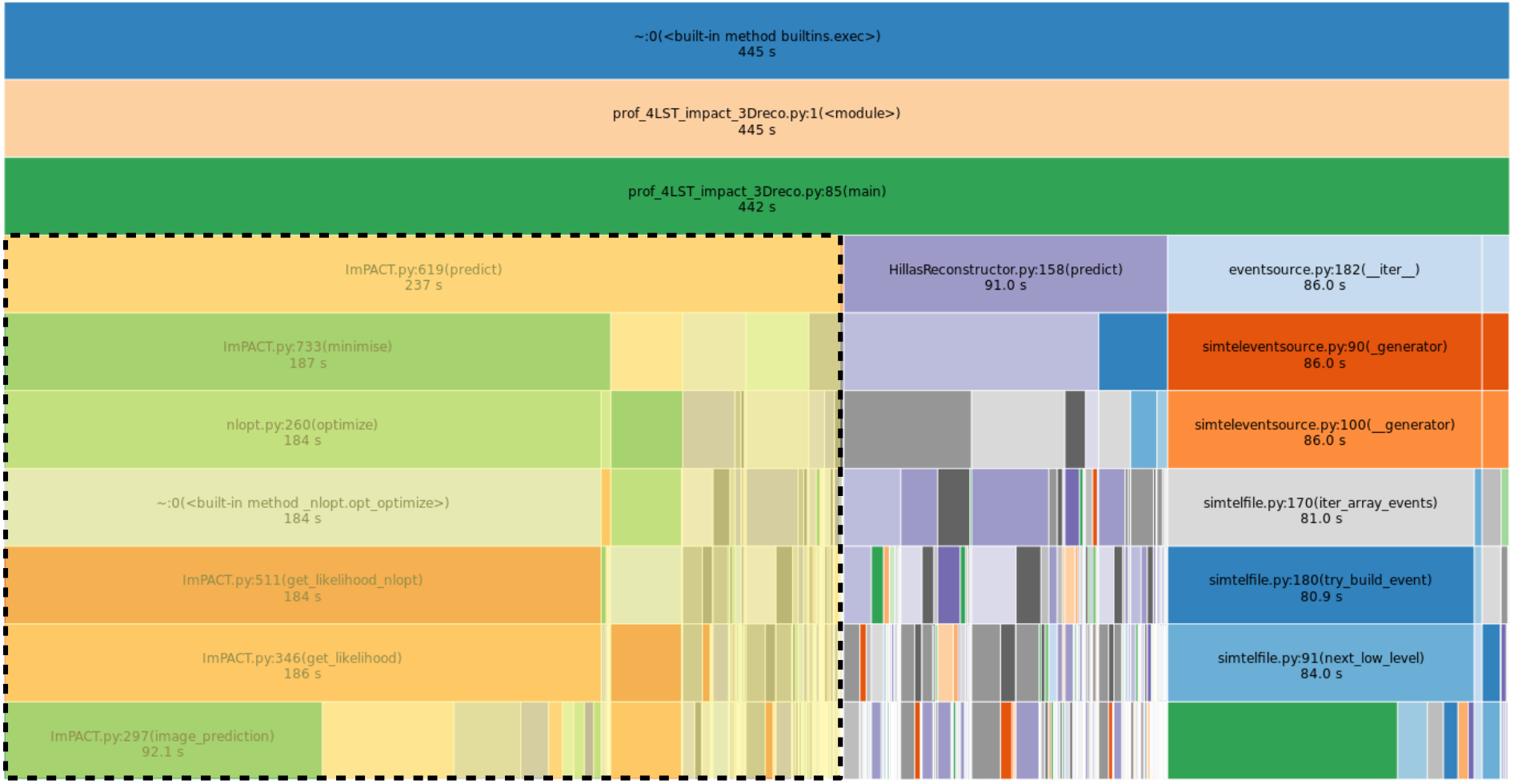
I/O

The profiling



3D reco

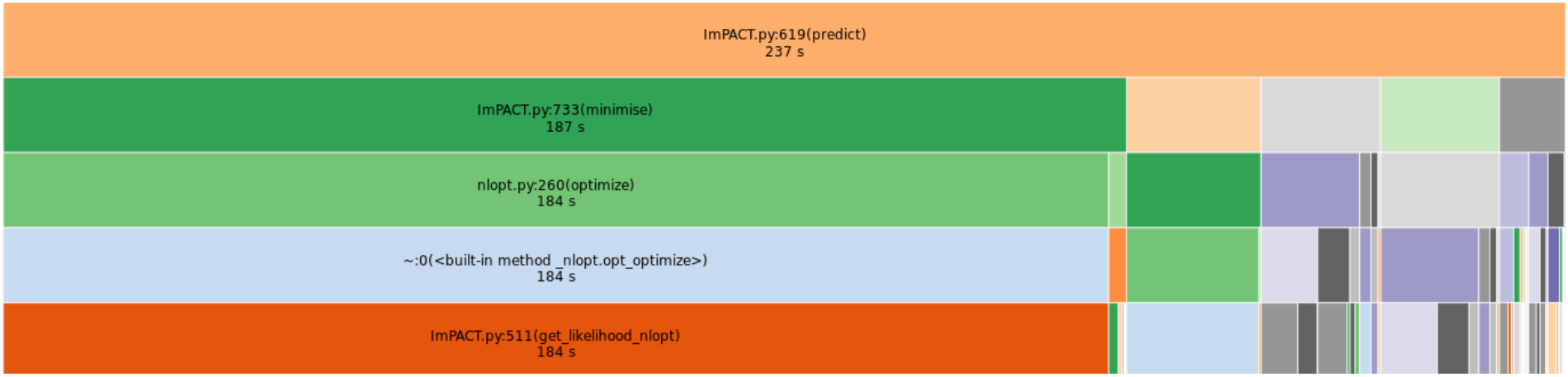
The profiling



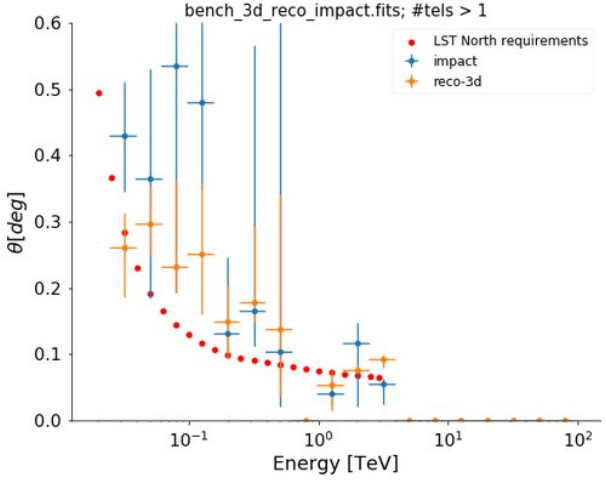
ImPACT.predict

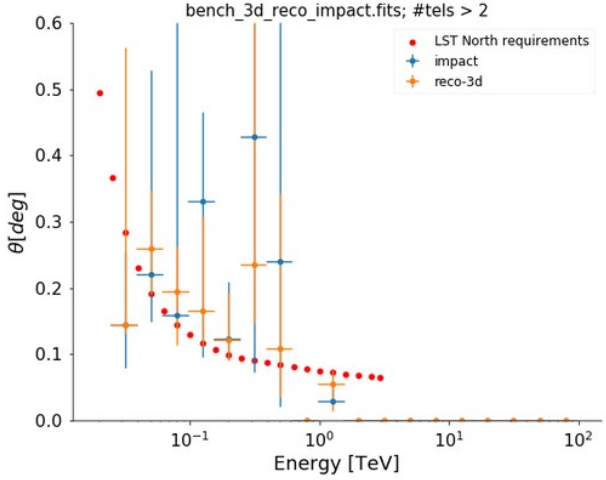
ImPACT optimization - 0

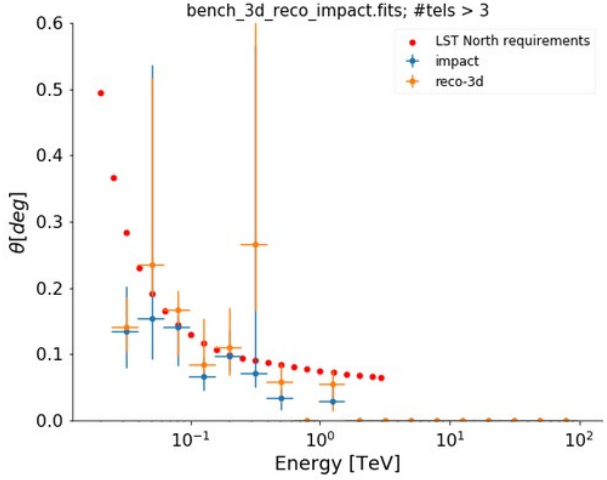
- create physics benchmark



4 LSTs, Paranal, gamma, z20

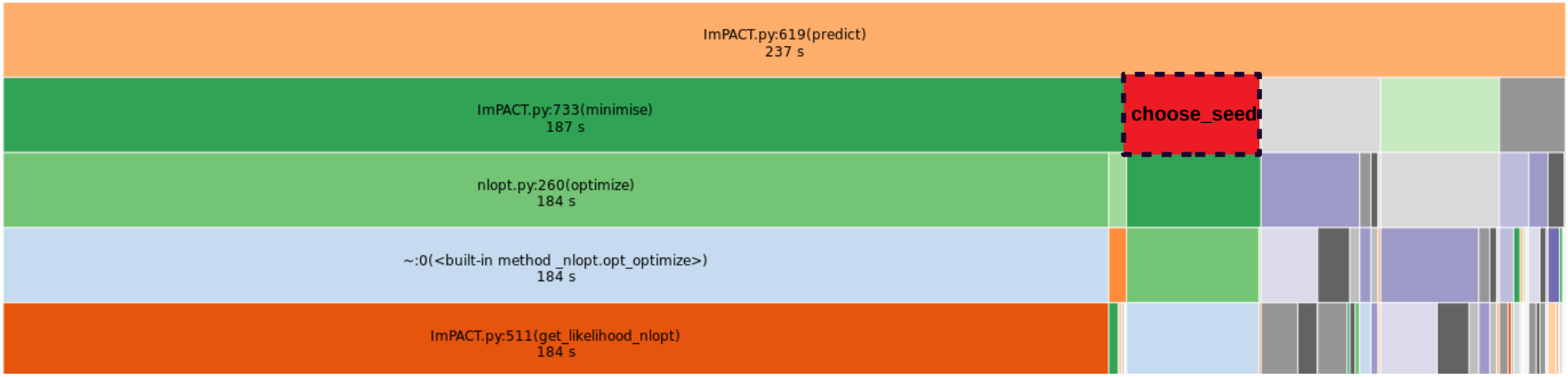




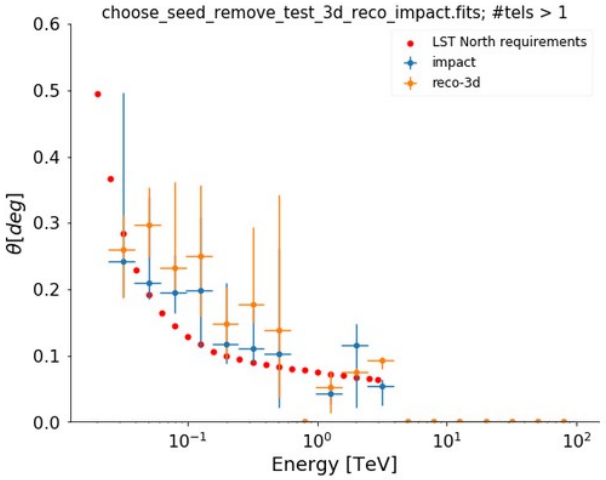


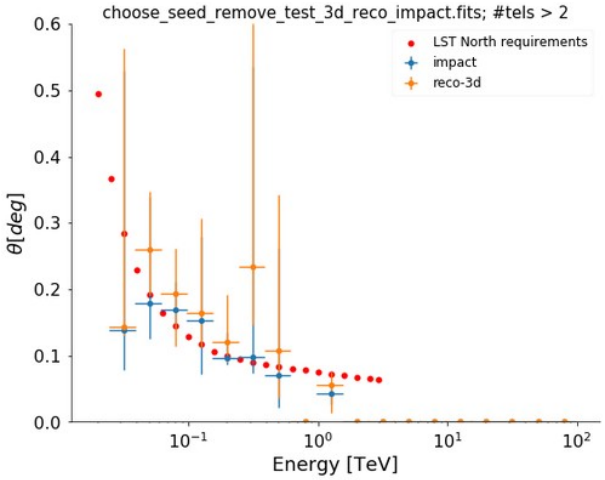
ImPACT optimization - 1

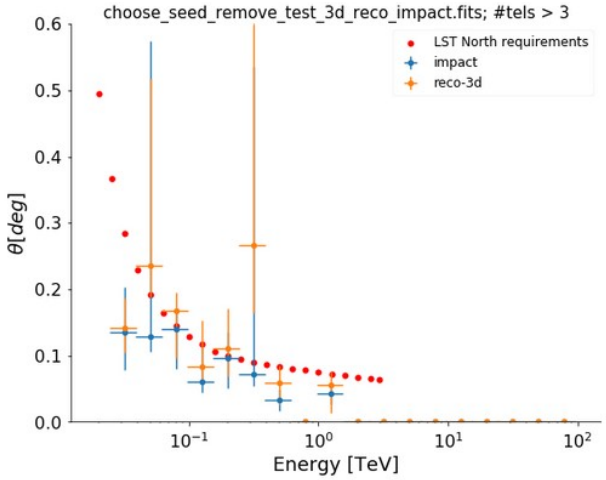
- Remove choose_seed function which re-choose the seed among many seeds (if #telescopes < 4)



4 LSTs, Paranal, gamma, z20

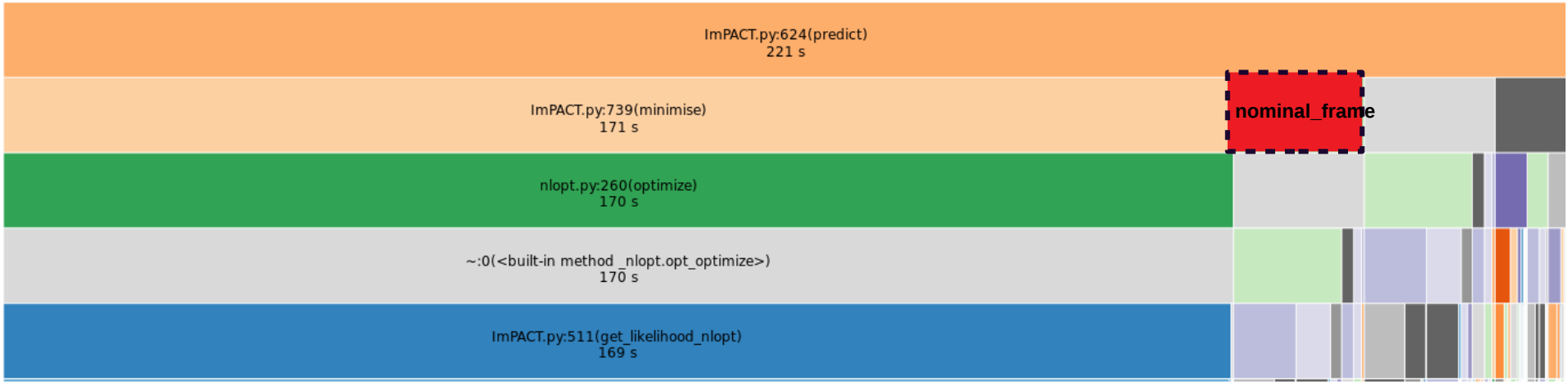




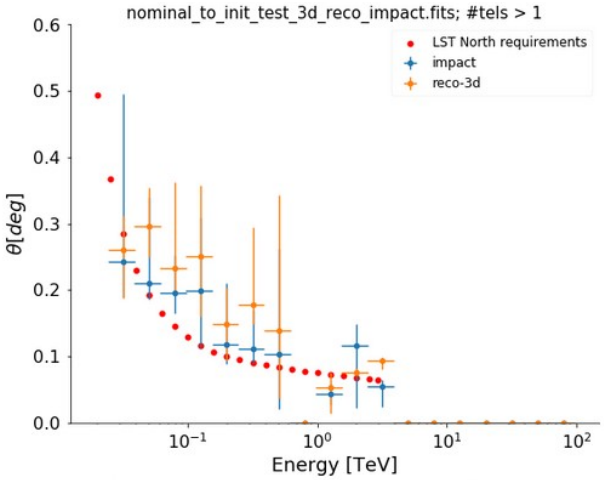


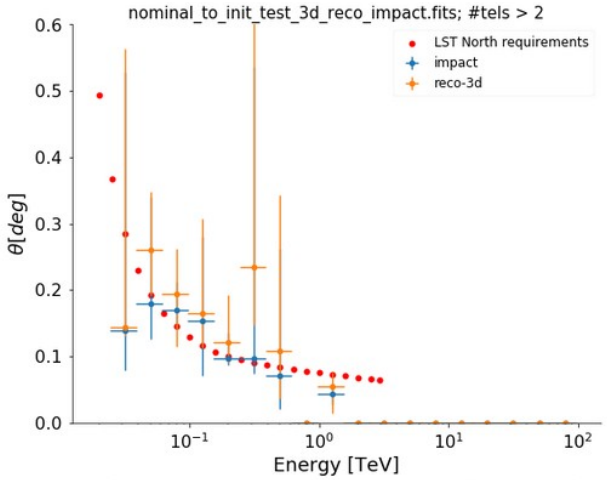
ImPACT optimization - 2

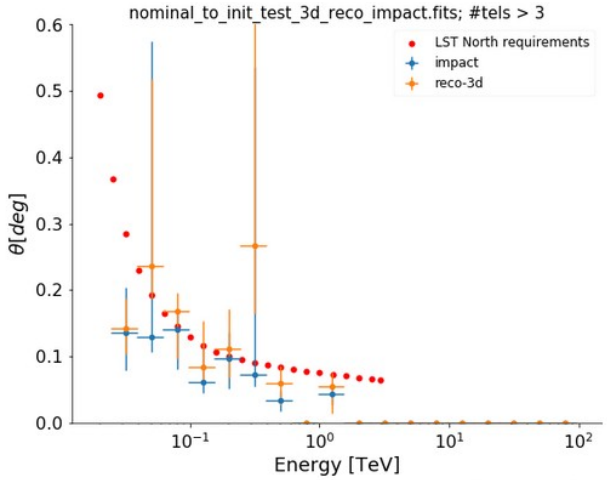
- Remove nominal frame creation at each function call..it's the same for all the events



4 LSTs, Paranal, gamma, z20

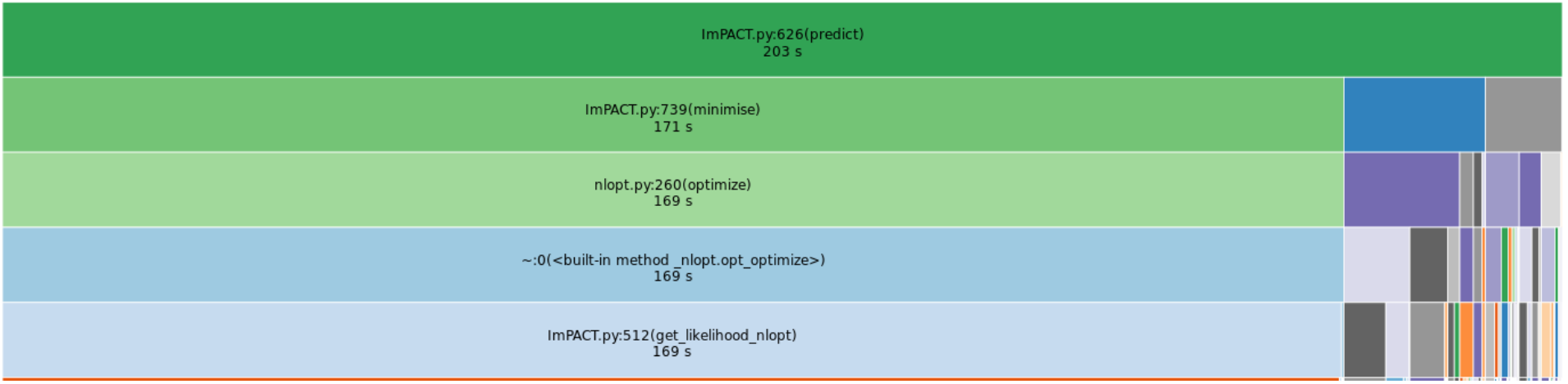




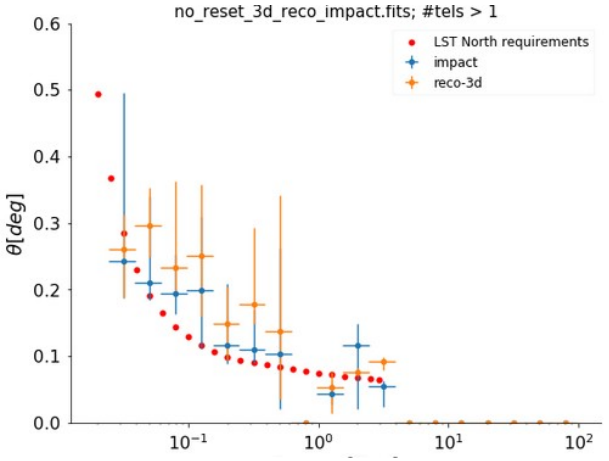


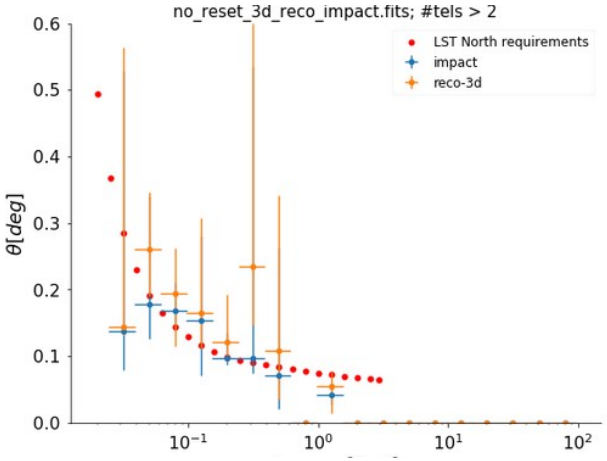
ImPACT optimization - 3

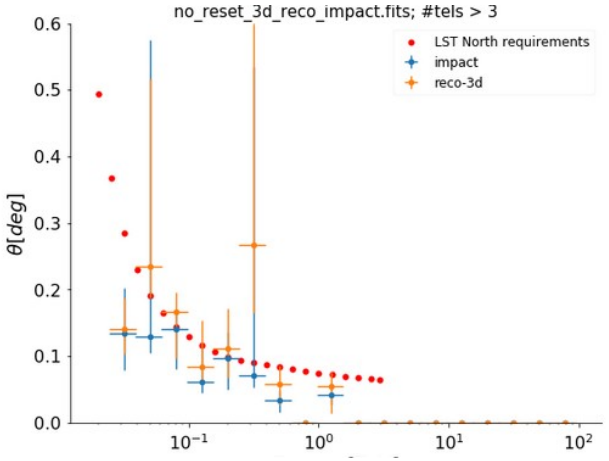
- the overall ImPACT part is 15% faster with much better results...it's a double win!



4 LSTs, Paranal, gamma, z20







Next steps…

- Final goal:
  - Better physics performances
  - Low overhead with respect to the standard analysis
- A bit more of work on the ctapipe optimization
- Many ideas on how to port it on GPU