

Towards a Cherenkov Telescope Ring

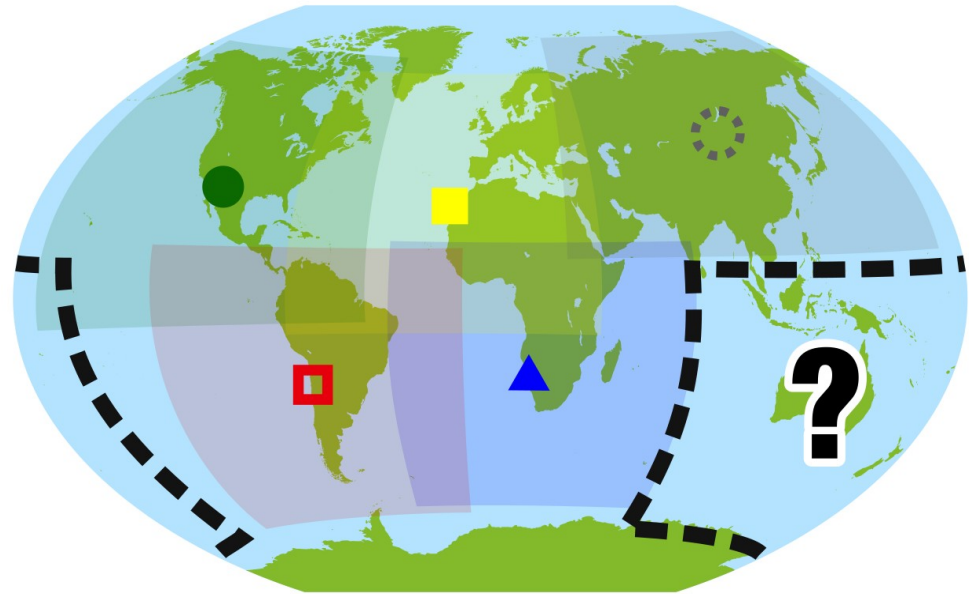
Project Overview and Update

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Cherenkov Telescope Ring (CTR)

- An idea for a world-wide network of Imaging Air Cherenkov Telescopes
- Allows for instantaneous follow-up on transients
- Allows for continuous monitoring of sources over days
- Necessitates a telescope in Australia



VERITAS (●), MAGIC (■),
CTA-South (□), H.E.S.S. (▲)

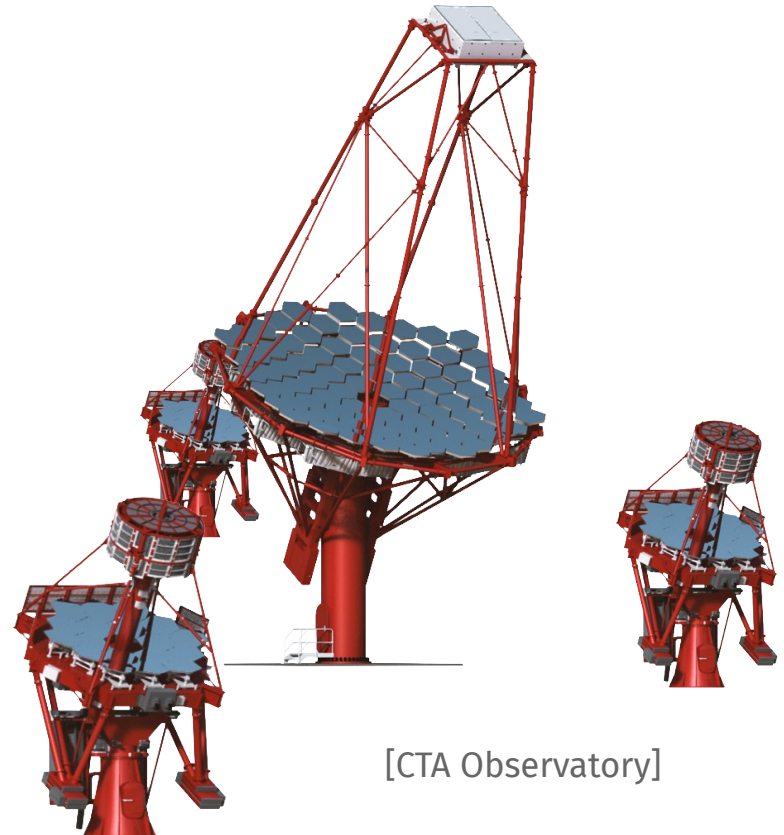
Australian site: Location

- An Australian site would be needed
- Which location?
- Weather conditions?
- Accessibility?
- Does altitude significantly affect performance?
- Weather studies talk to come by Paddy and Sabrina
 - <https://indico.cta-observatory.org/event/3416/contributions/28556/>



Australian site: Configuration

- How does the performance compare between:
 - SSTs in an array of 1, 2, 3, 4...
 - MSTs in an array of 1, 2, 3, 4...
 - How widespread?

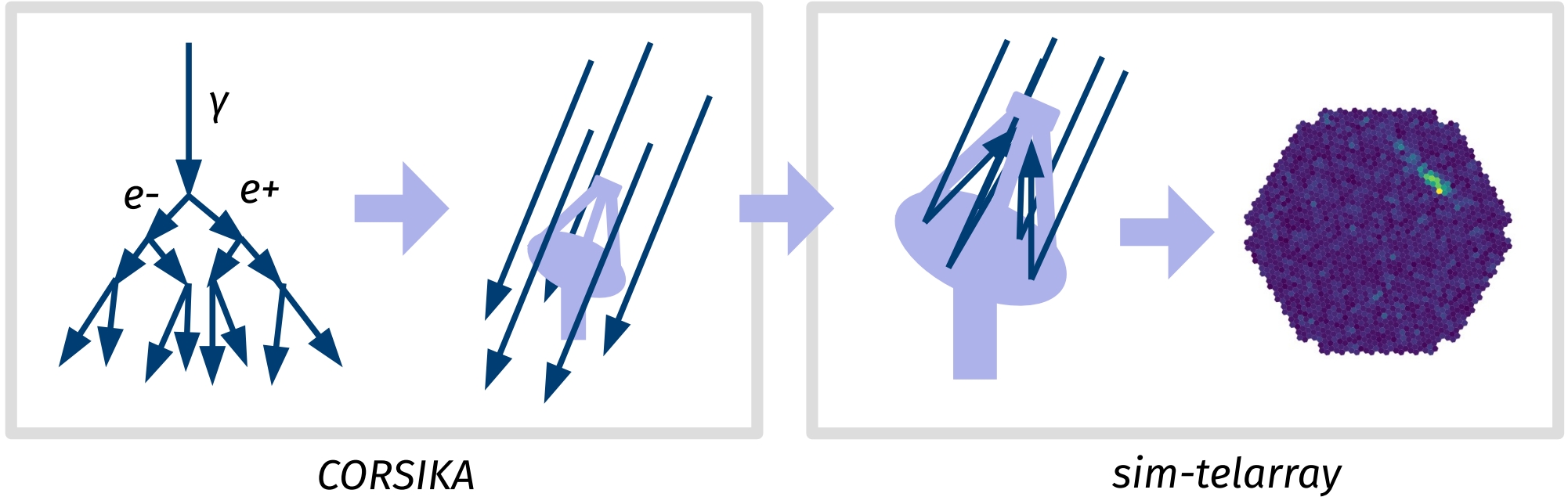


[CTA Observatory]

Project outline

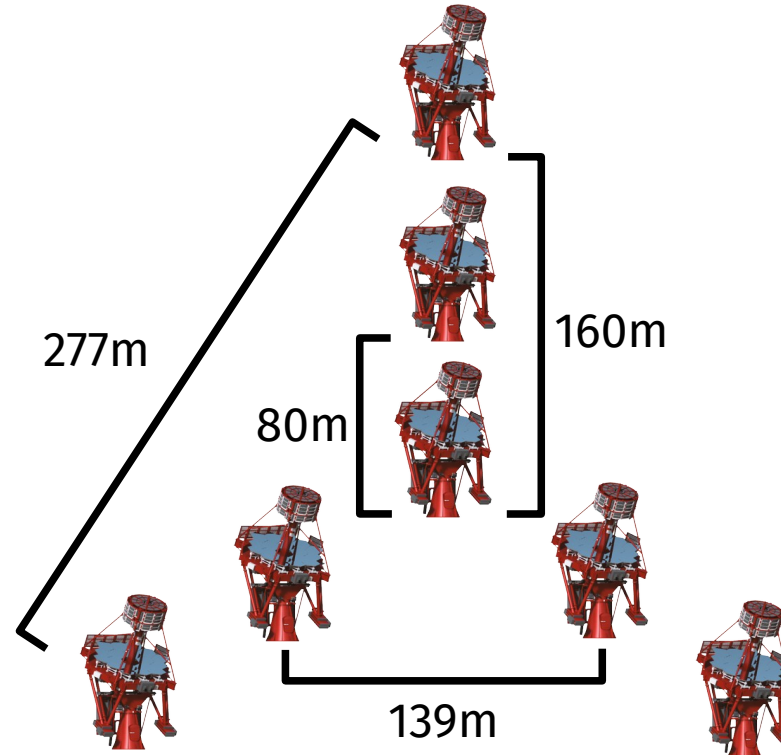
- Investigate Australia telescope site possibilities with simulations
- Aiming to understand:
 - Significance of **altitude**
 - Performance difference between **telescope sizes**
 - Amount of improvement with **more telescopes**
 - Performance difference between **geometric configuration**

CORSIKA & sim-telarray



Simulation setup

- 7-telescope arrangement to investigate a variety of array setups
- Simulating both MST and SST arrays



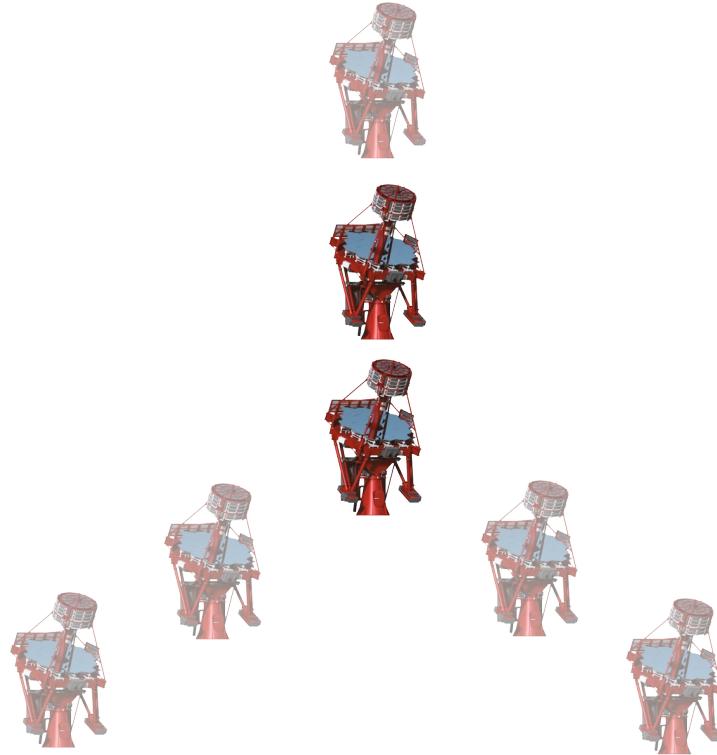
Simulation setup

- Telescope 1
- Monoscopic setup



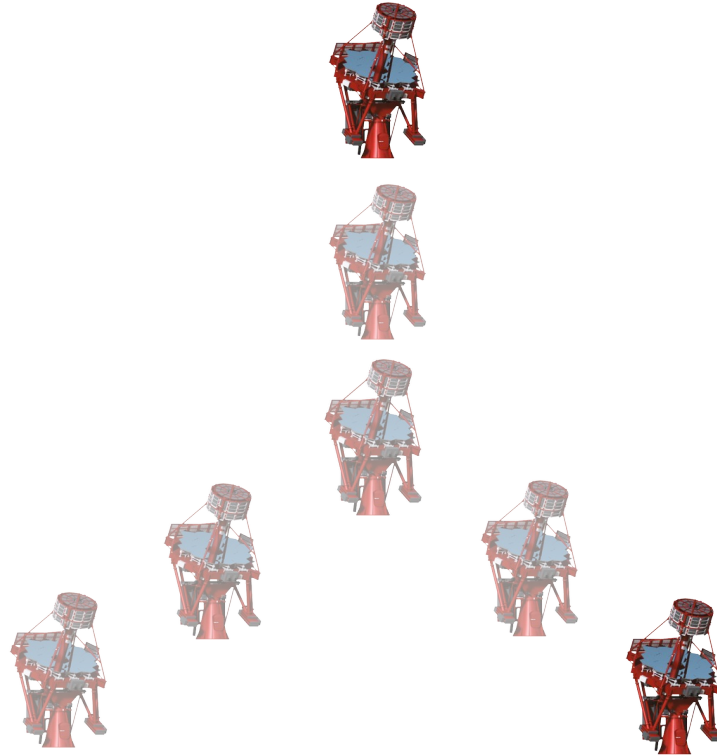
Simulation setup

- Telescope 1 & 2
- Stereo setup with 80m baseline



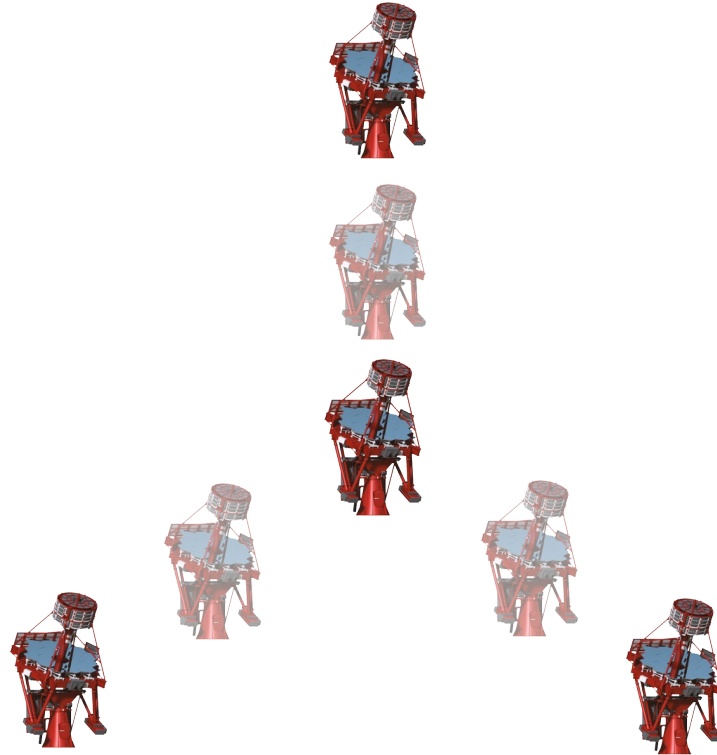
Simulation setup

- Telescope 5 & 6
- Stereo setup with 277m baseline



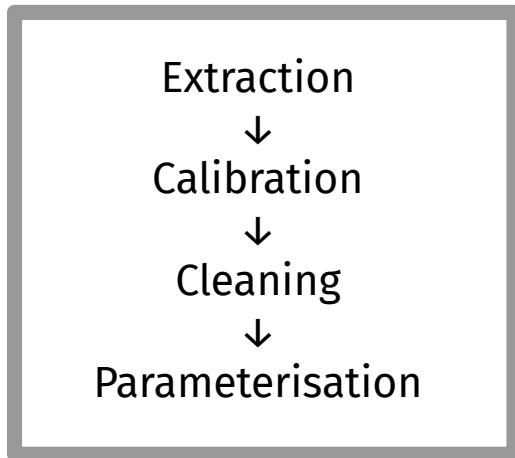
Simulation setup

- Telescope 1 & 5 & 6 & 7
- Four-telescope setup with 277m sides

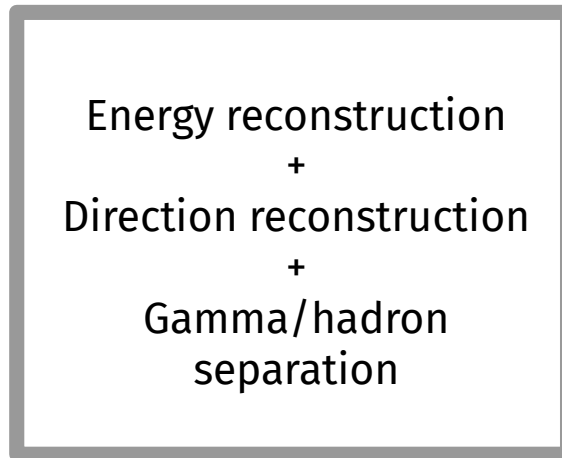


Analysis pipeline

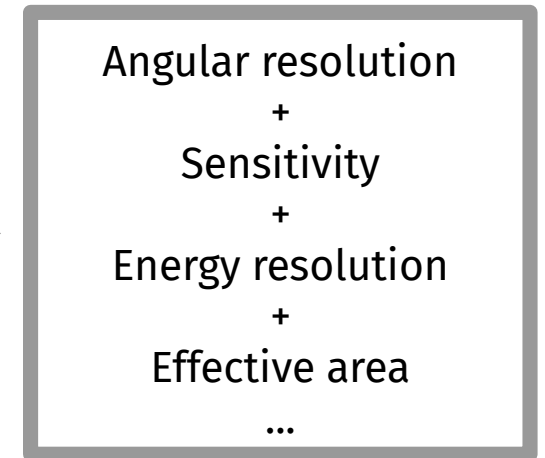
Low-level processing



High-level processing



Performance



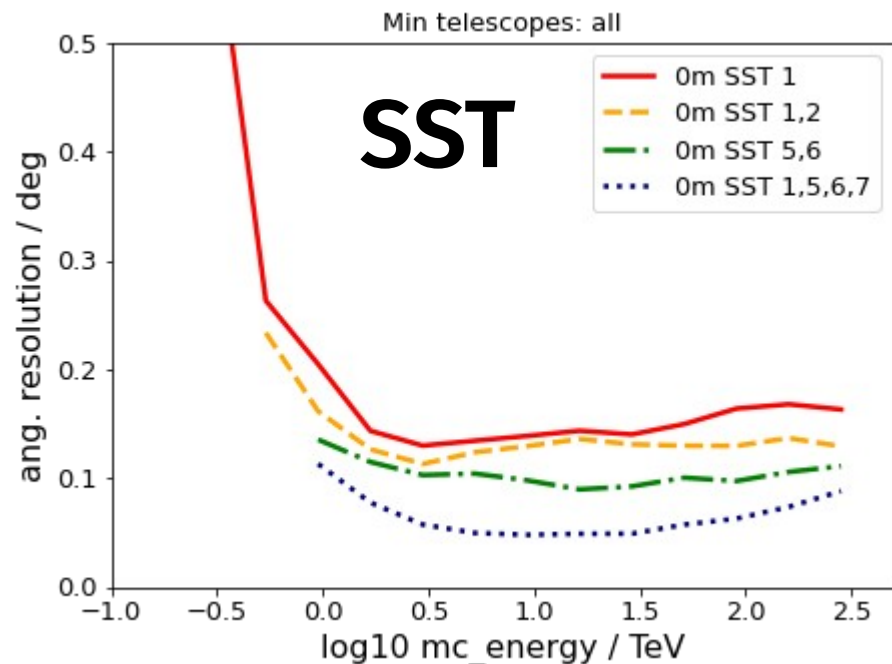
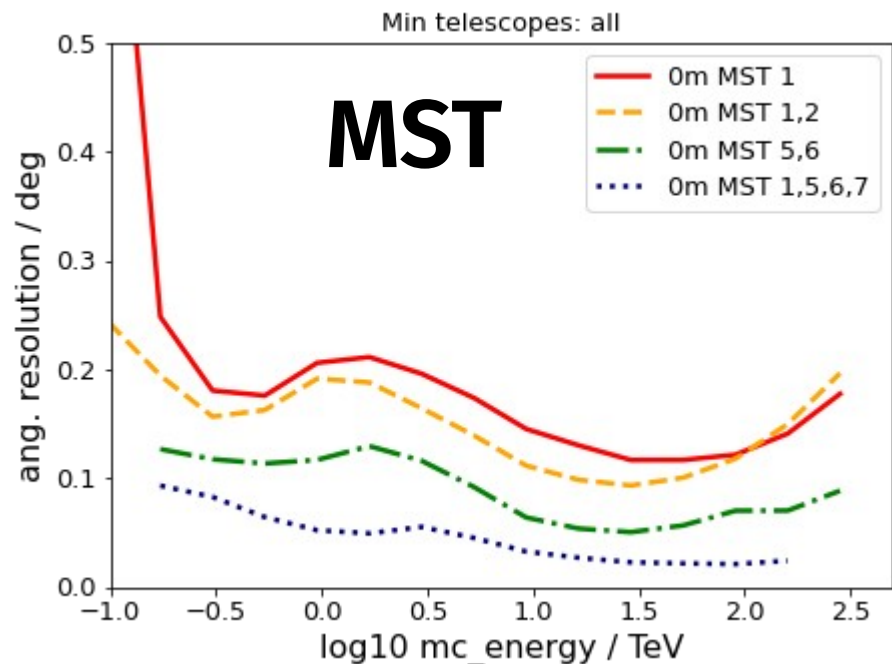
Further details

Refer to previous CTA-Oz talk:

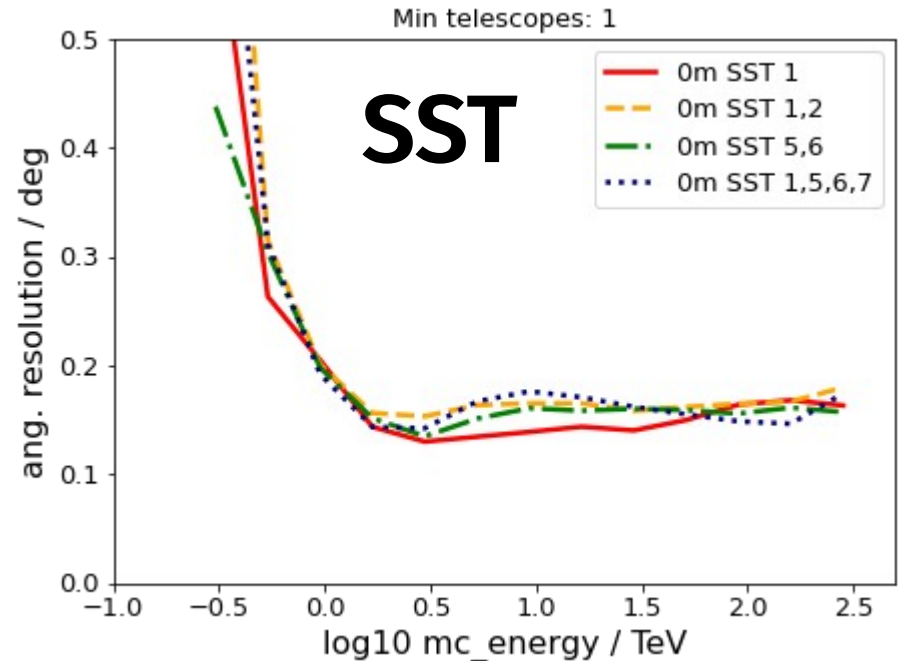
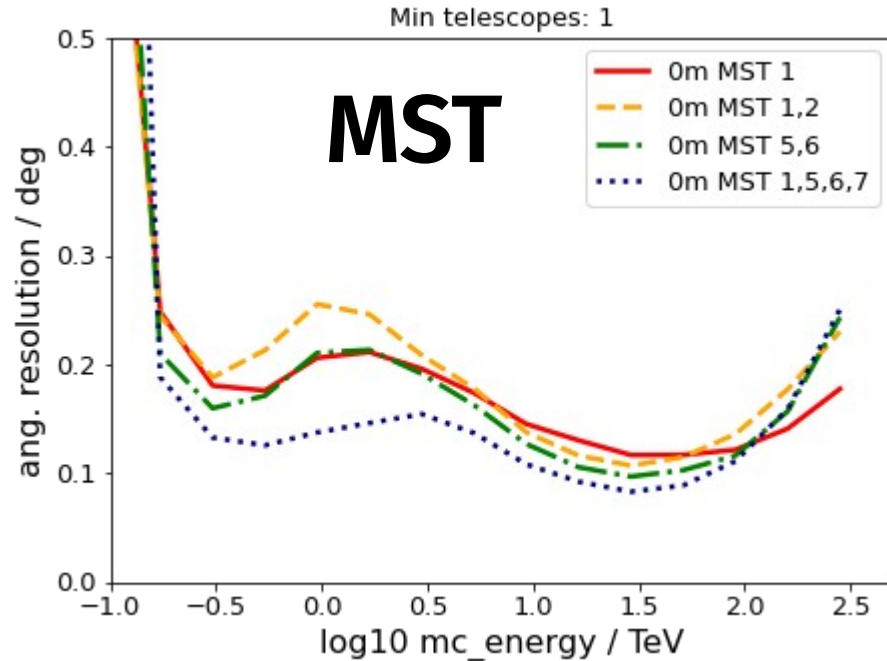
<https://indico.cta-observatory.org/event/3063/contributions/26413/>

Early performance comparisons

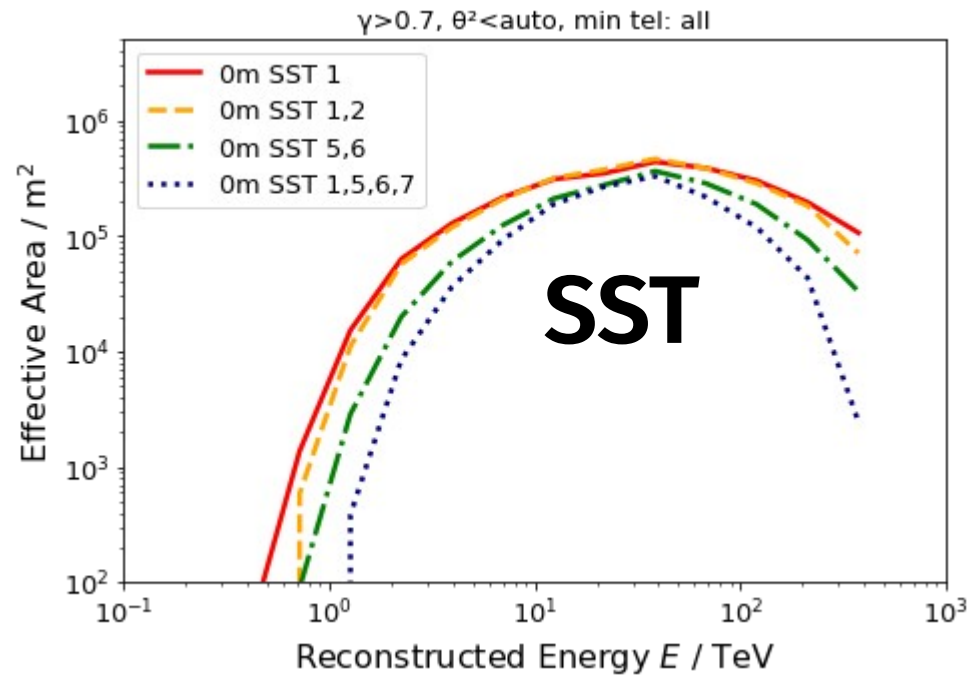
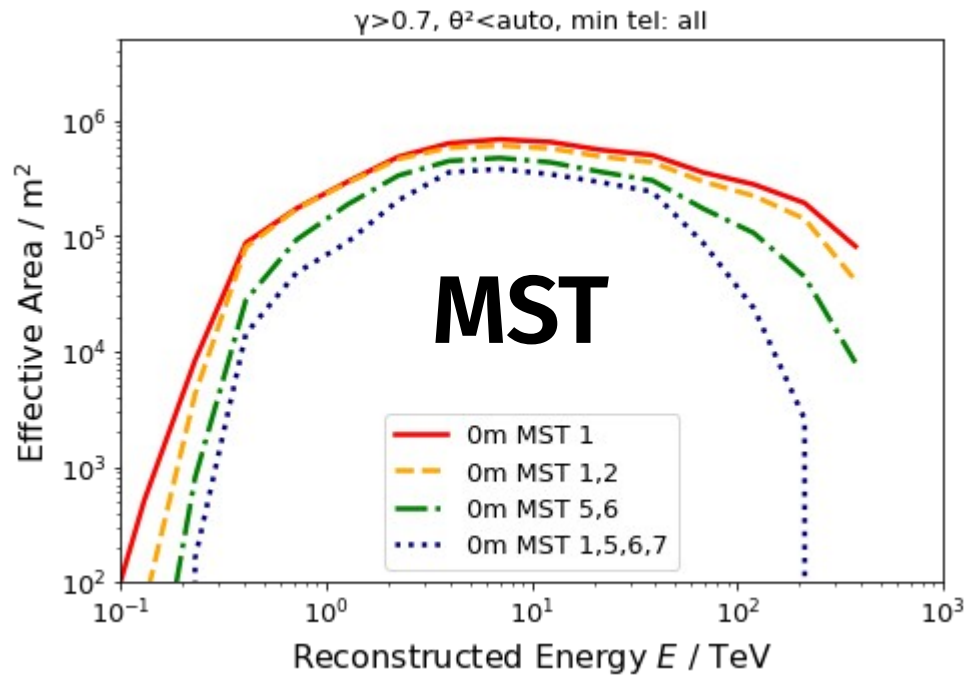
Angular resolution



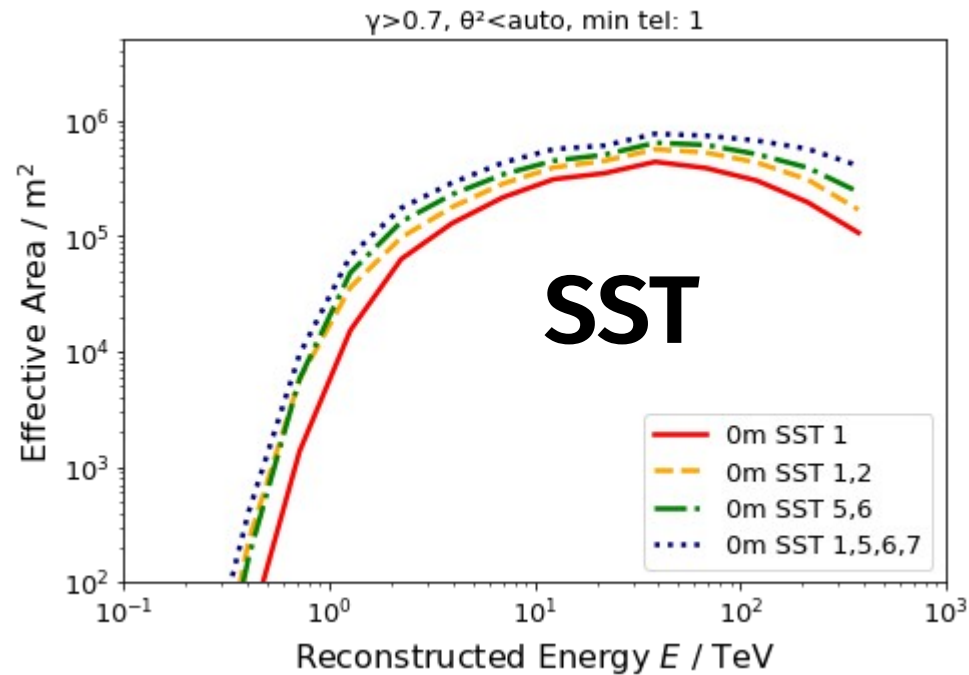
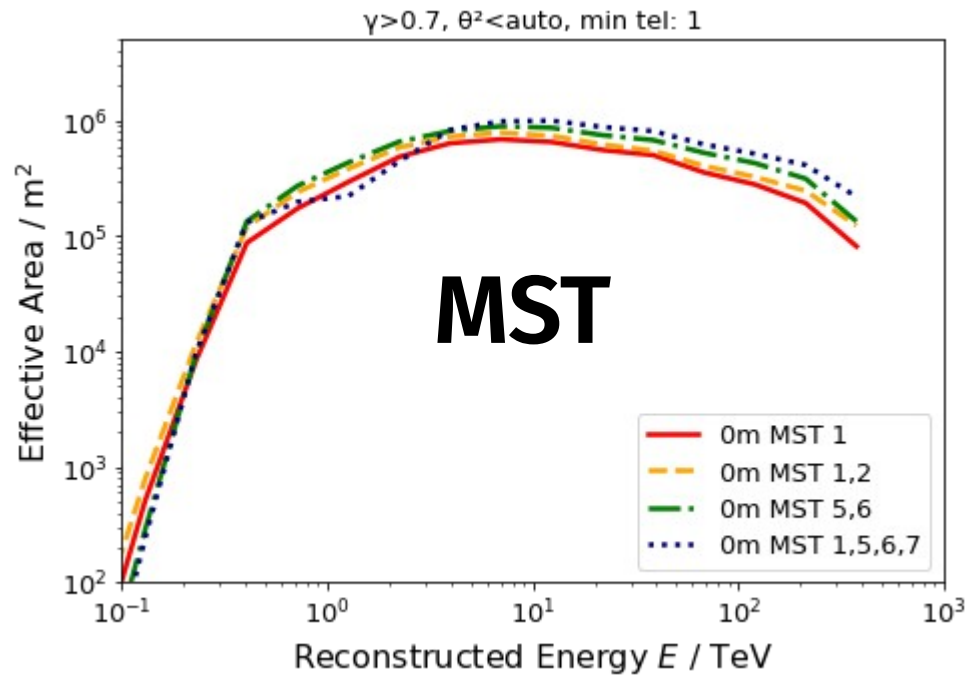
Angular resolution



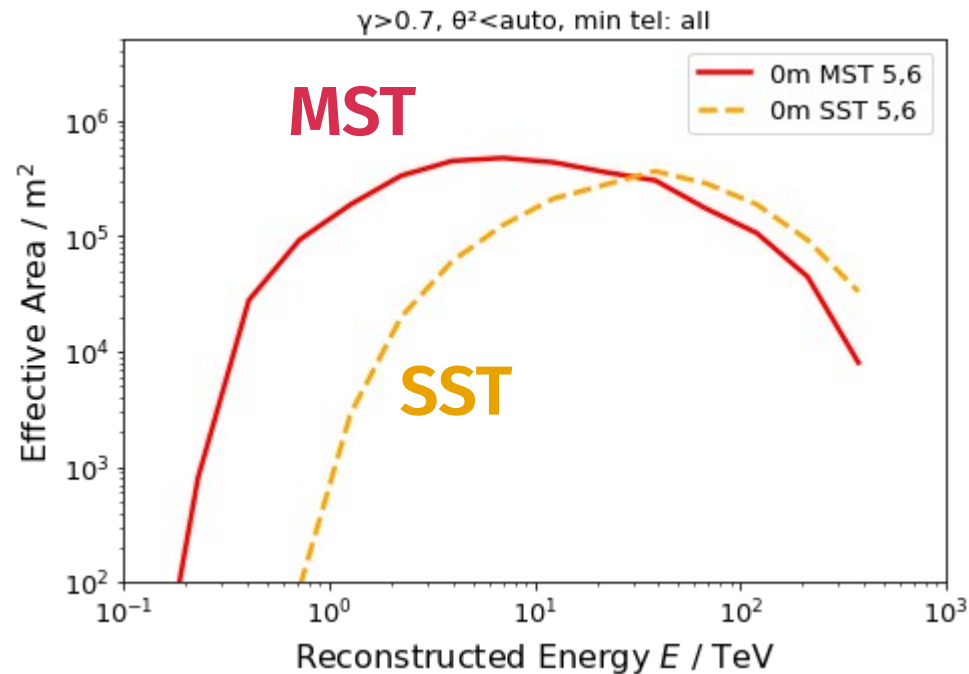
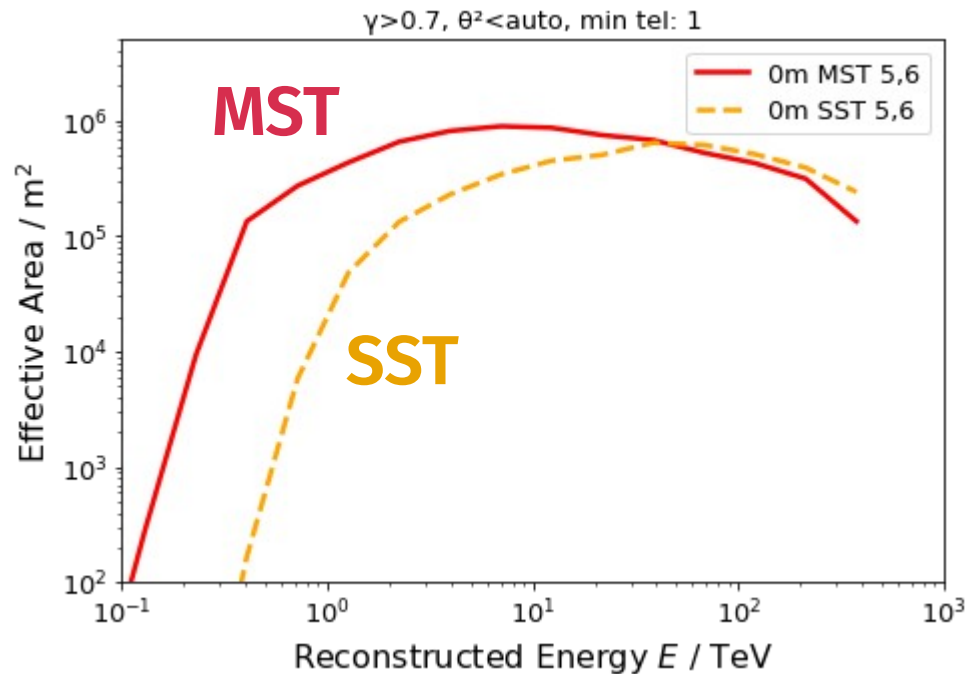
Effective area



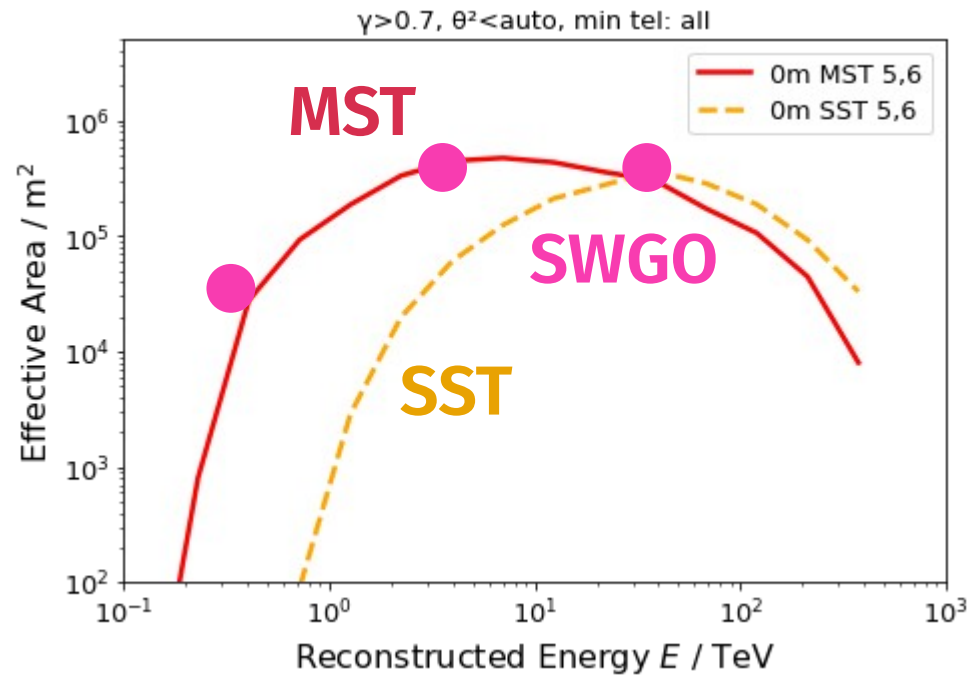
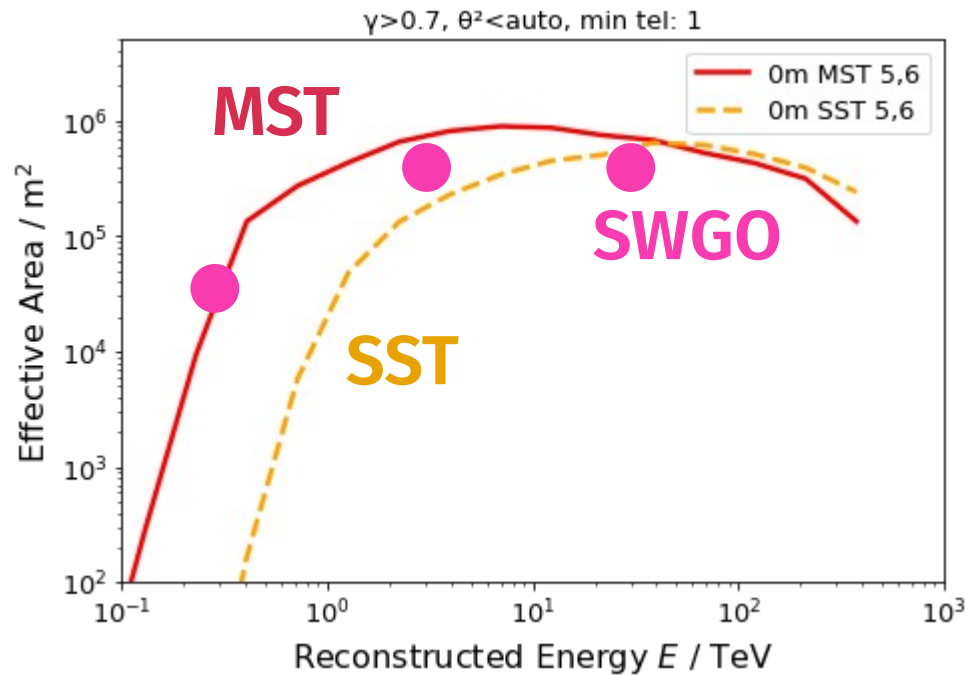
Effective area



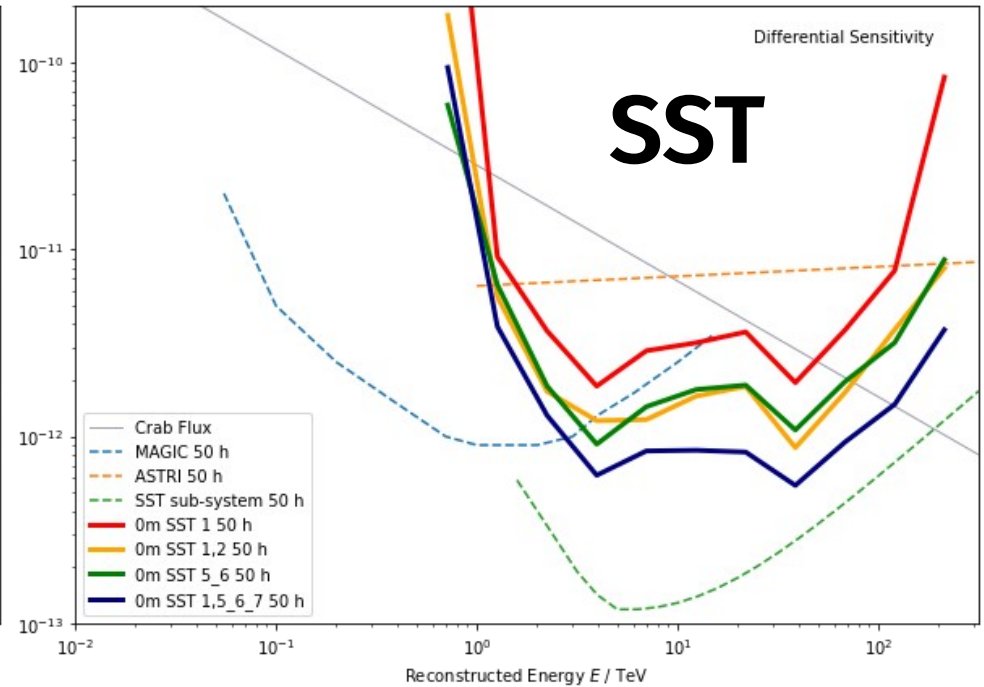
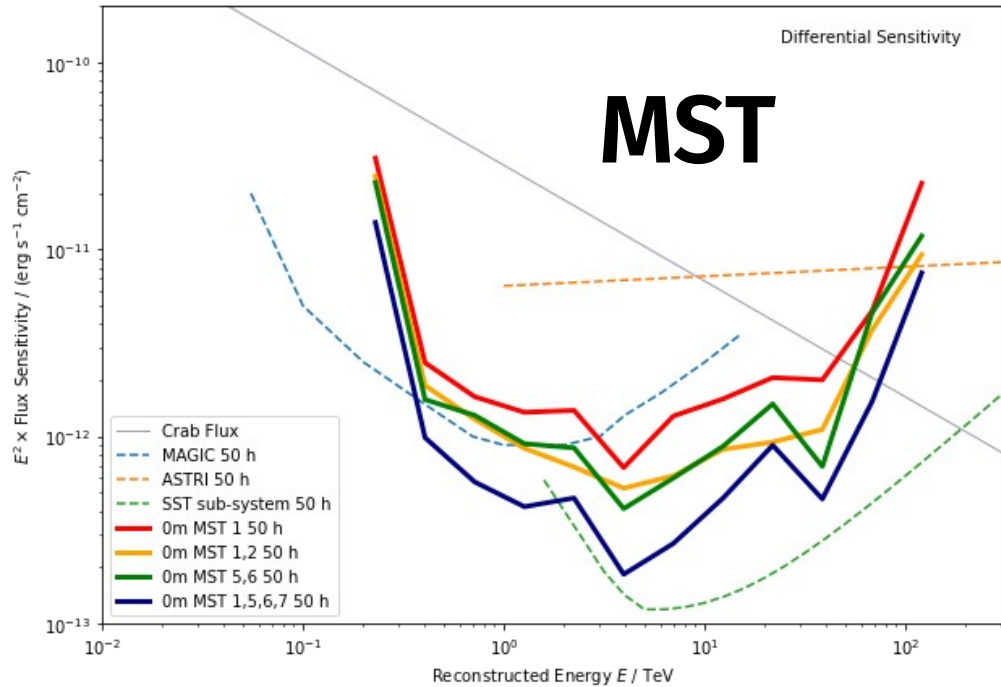
Effective area



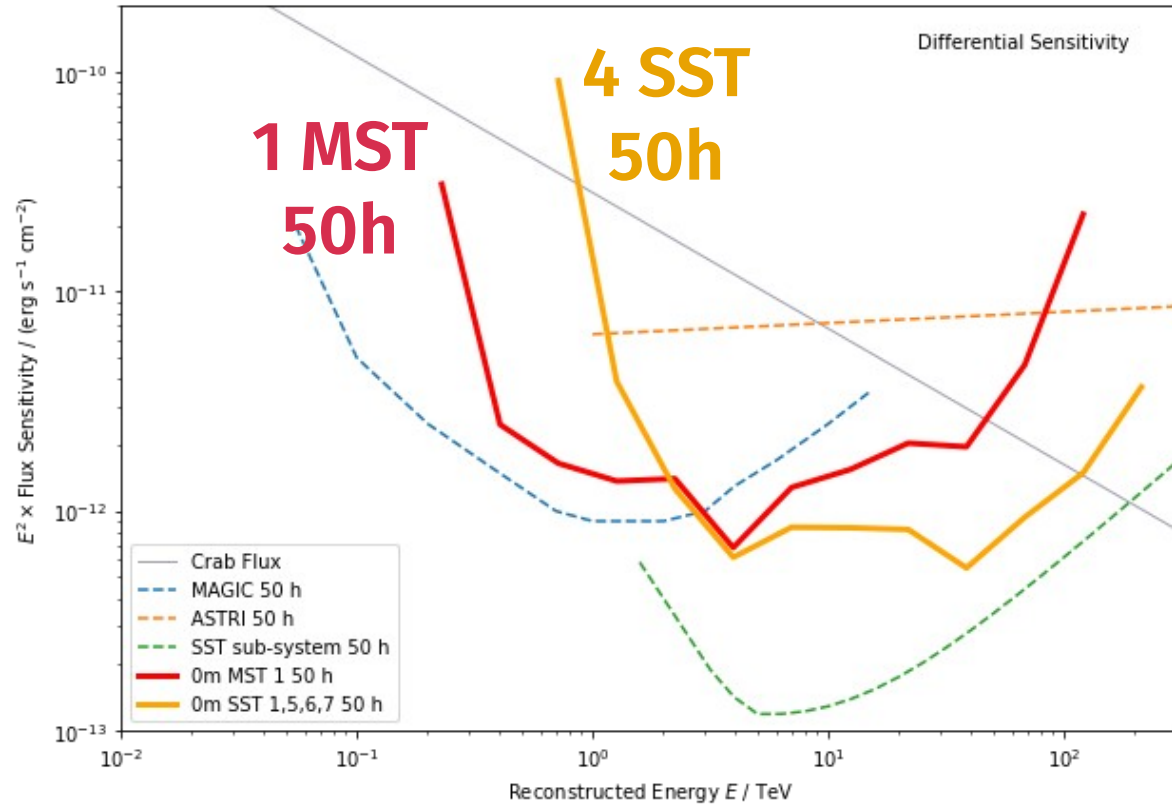
Effective area



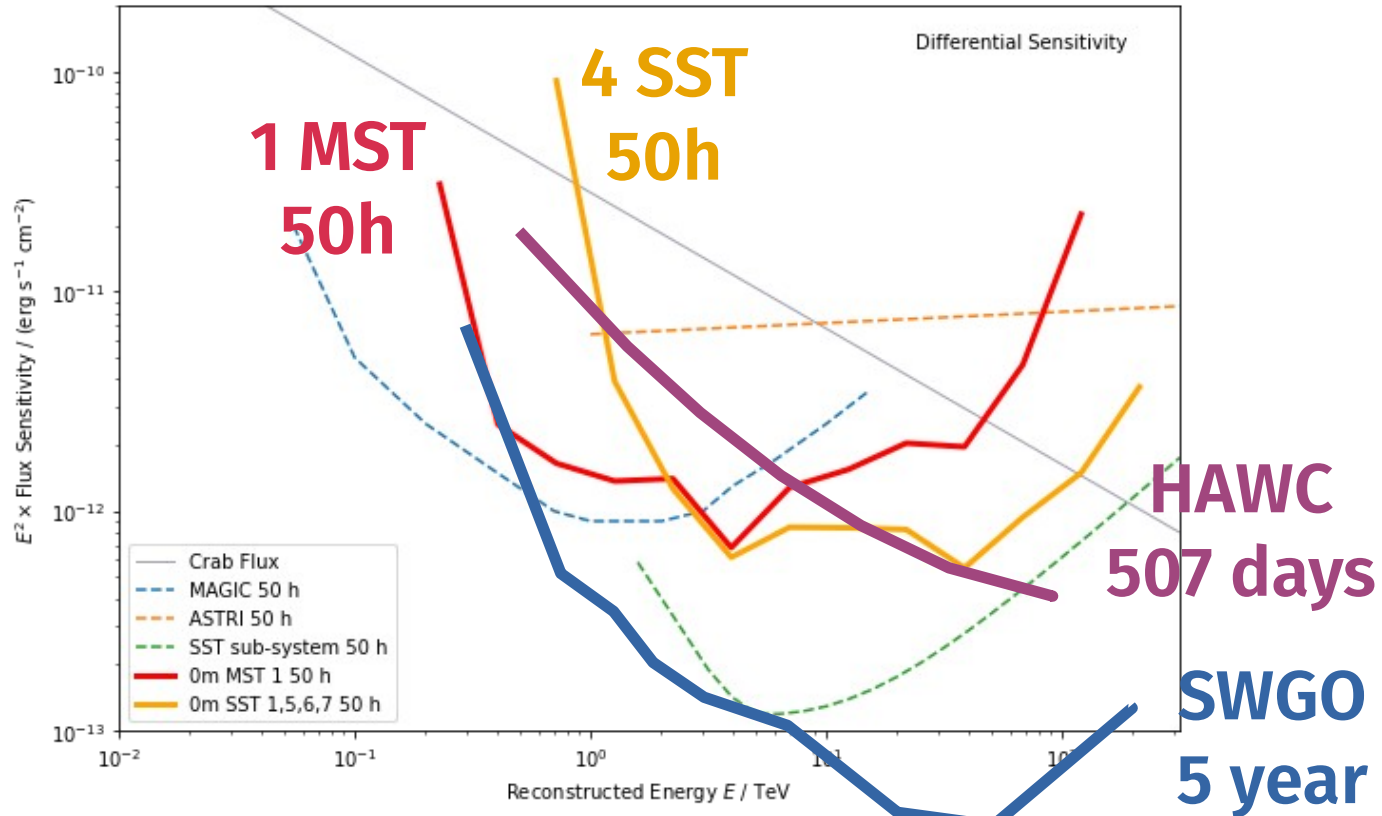
Sensitivity



Sensitivity



Sensitivity



Conclusion

- The **Cherenkov Telescope Ring** is an idea to have a worldwide network of IACTs
- Simulations have been made to compare performance of different array setups and telescope types for one altitude
- Some preliminary performance comparison are showing promising results
- Future simulations will compare with an altitude of 0m, compared to 1000m

Thankyou