

Pulse laser calibration of Cherenkov telescopes from an airship

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AstroGeoInformatics
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Calibration

- there is no natural science without measurements
- there is no measurements without **calibrated** instruments

CALIBRATION == the comparison of measurement values delivered by an instrument (under test) with those of a standard (of known accuracy)

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→ astronomy
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CALIBRATION == the comparison of measurement values delivered by an instrument (under test) with those of a standard (of known accuracy)
→ Cherenkov telescope

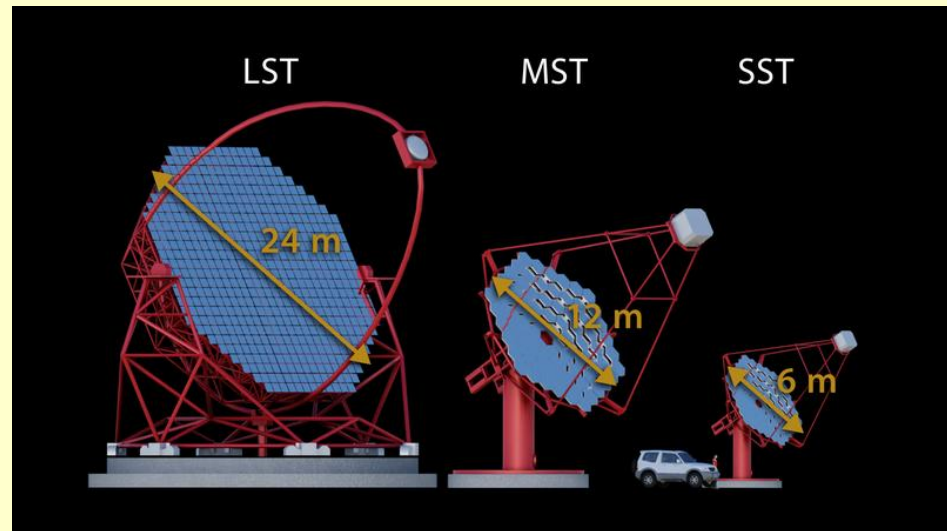
Cherenkov telescope

- in full: Imaging Atmospheric Cherenkov Telescope (**IACT**)

CHERENKOV TELESCOPE == a ground-based instrument for gamma-ray astronomy at very-high energies (from some tens of GeV to some hundreds of TeV)



MAGIC (30 GeV to 100 TeV)



CTA (20 GeV to 300 TeV)

Cherenkov telescope

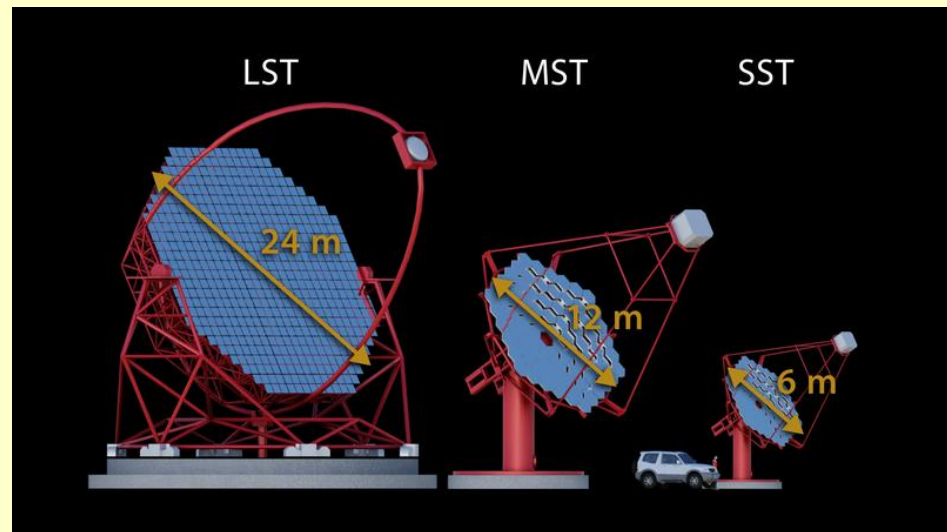
also: Imaging Atmospheric Cherenkov **Technique** →

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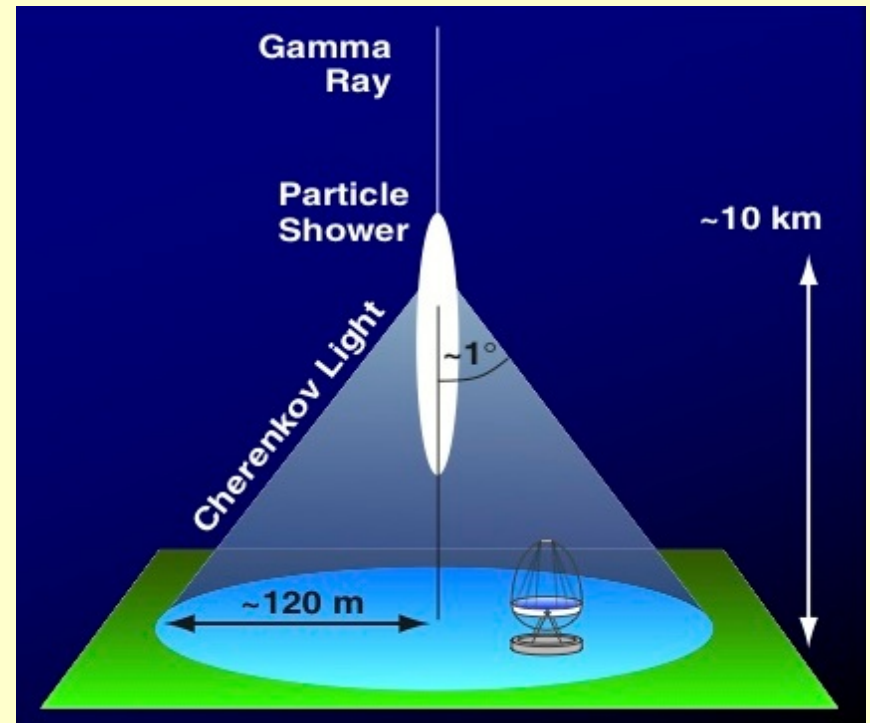
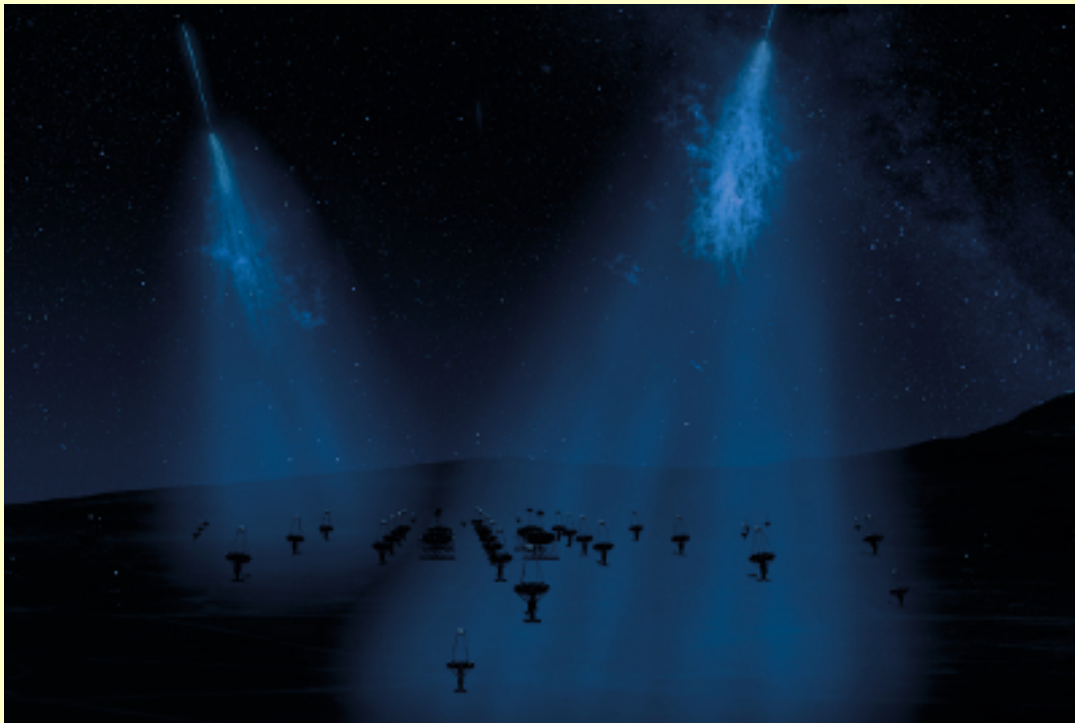
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Imaging Atmospheric Cherenkov Technique

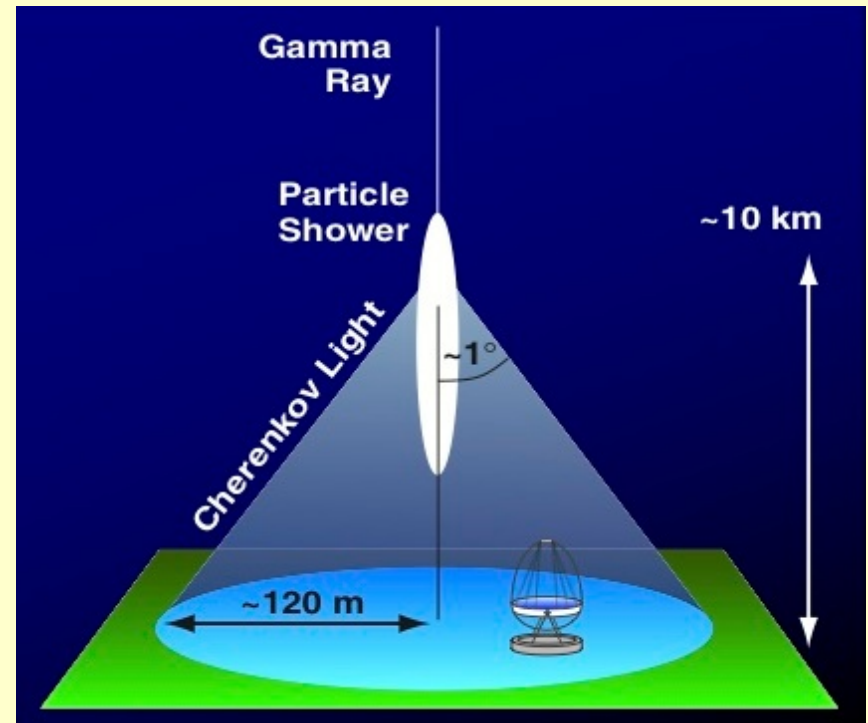
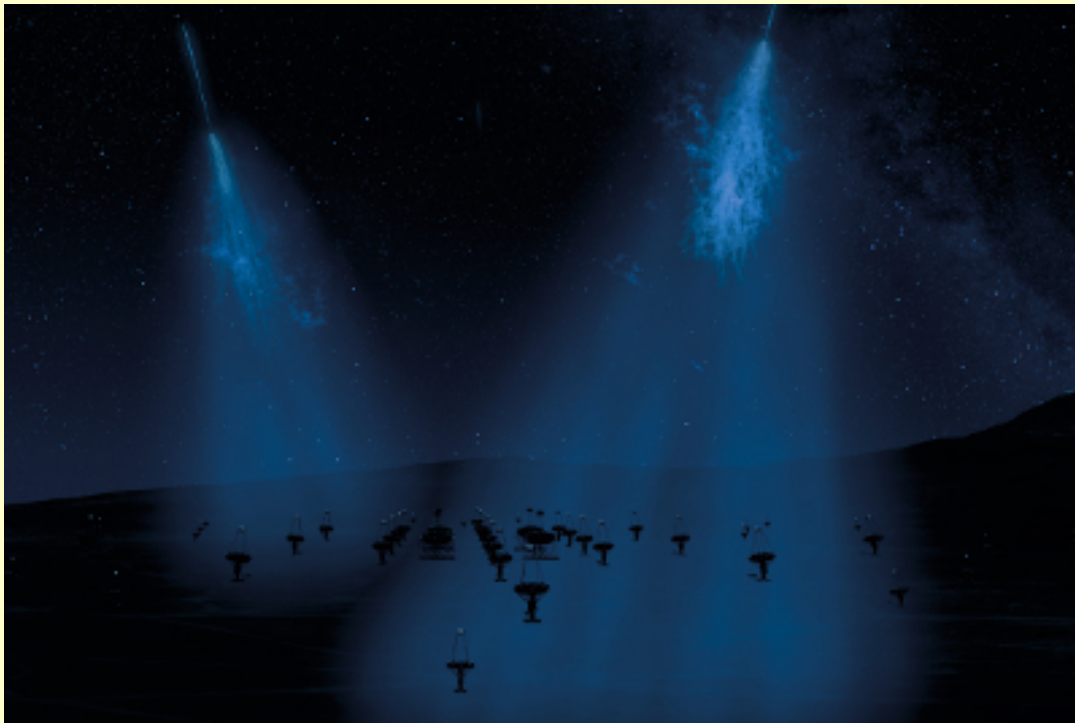
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Imaging Atmospheric Cherenkov Technique

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→ a part of the detector



The atmosphere as a part of the detector

- (direct) calibration should include the atmosphere
- but... there is no **test beam** for Cherenkov telescopes
- so, (indirect) calibration relies on Monte Carlo simulations

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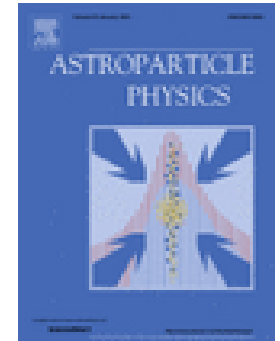
Is there anything we can do about it
(concerning recent advances in technology)?

A proposal: octocopter




Astroparticle Physics

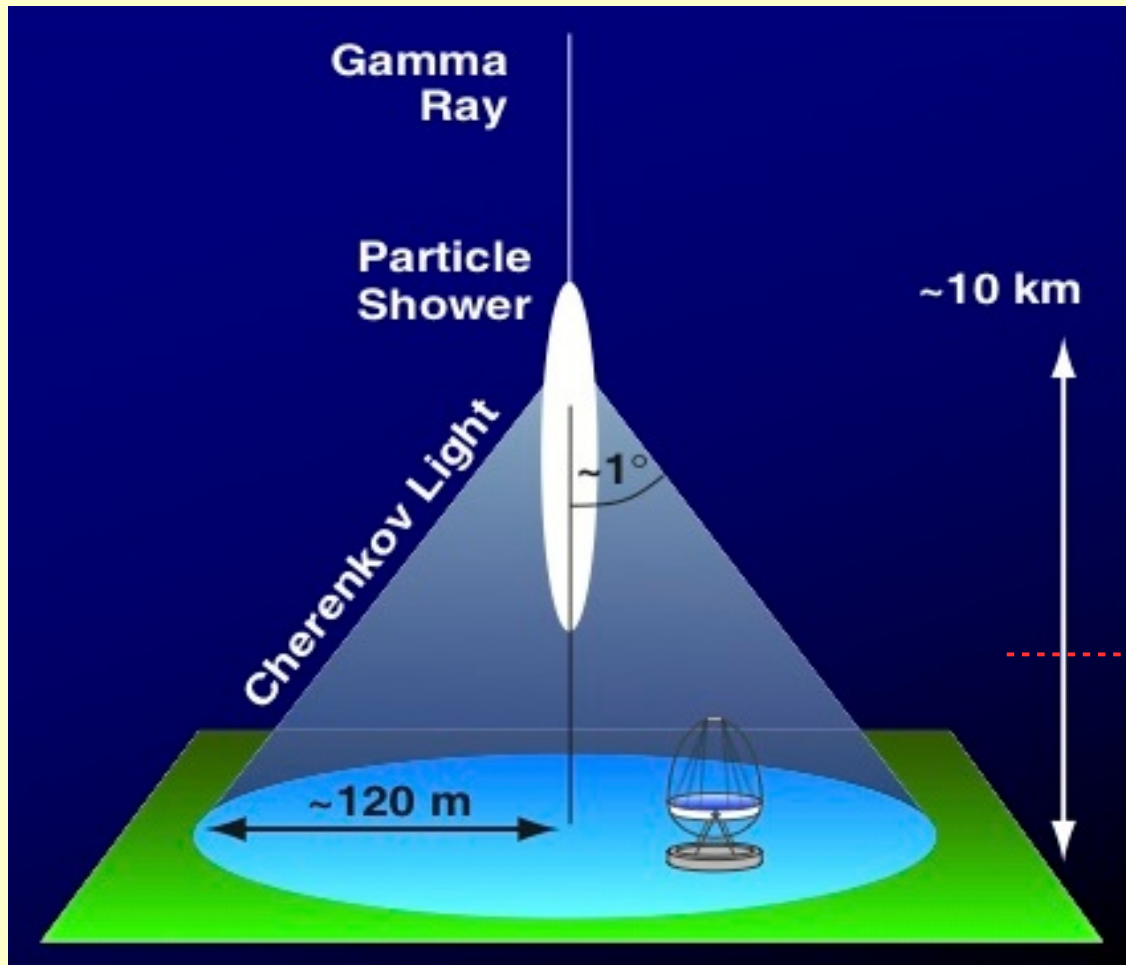
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On the prospects of cross-calibrating the Cherenkov Telescope Array with an airborne calibration platform

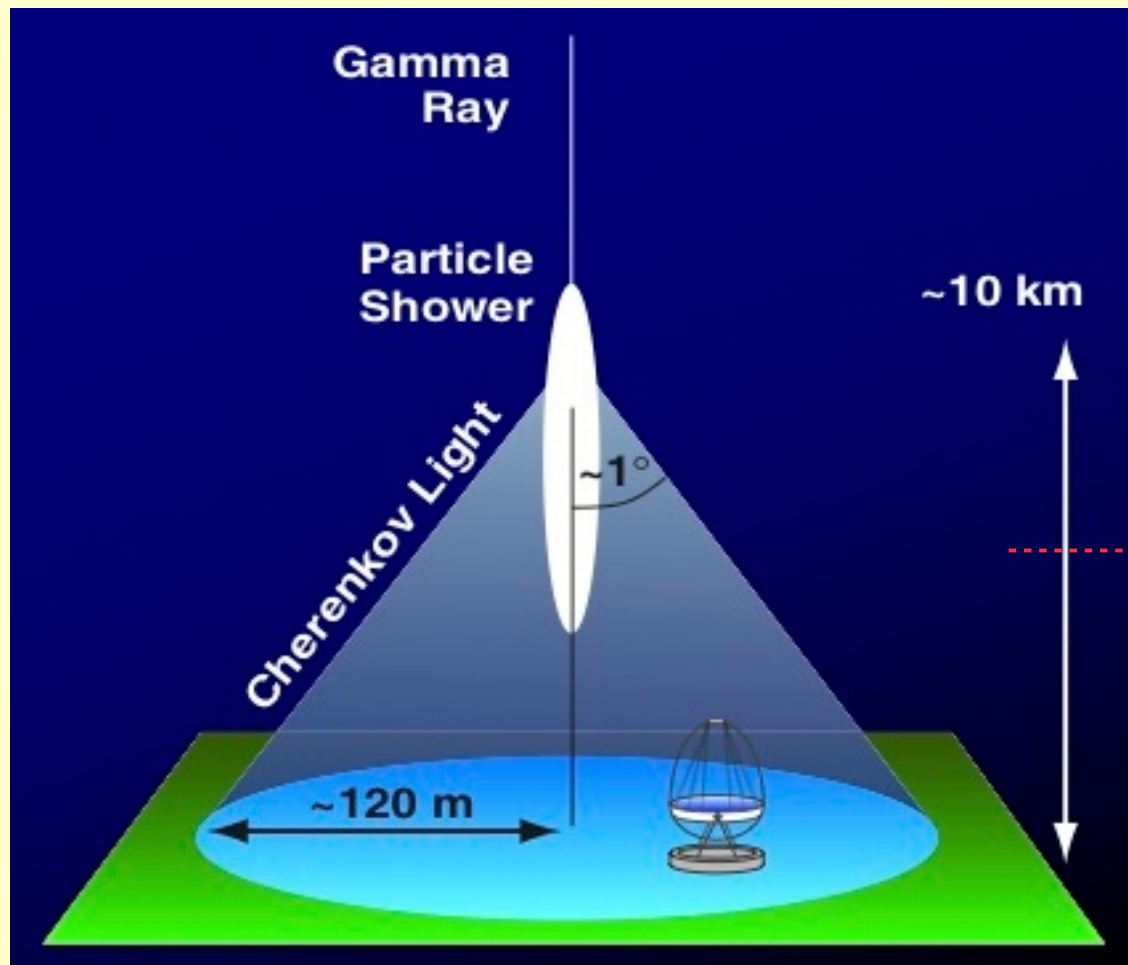
Anthony M. Brown 

A proposal: octocopter



- UV emitting LEDs + circular difuser, short pulses (4 ns)
- maybe too low and not safe enough

An advanced proposal: airship



e.g. Hipersfera d.o.o.



at least 5 km



e.g. TOPTICA Photonics

- study in progress: could uncertainty in E be $< 8\%$ for cross-calibration with a pulse laser (e.g. 515 nm, 70 mW) and difuser
- use of T , p and humidity sensors for the atmospheric characterisation