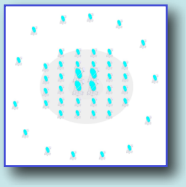


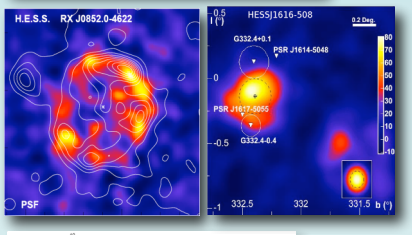
Cherenkov Telescope Array

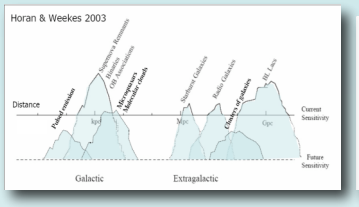
http://www.mpi-hd.mpg.de/hfm/CTA

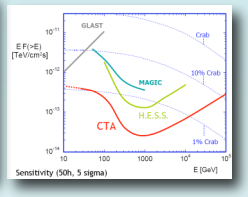
A proposal for a future facility for high-energy γ–ray astronomy

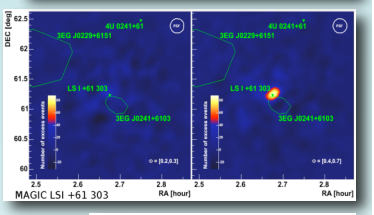
CTA is based on technologies employed by H.E.S.S. and MAGIC to explore the γ–ray sky with an order of magnitude increase in sensitivity compared to present Cherenkov telescopes

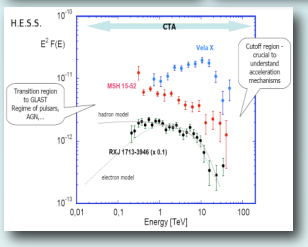
Very broad and diversified physics program with an excellent discovery potential: Galactic objects: X-ray binaries, SNR, pulsars, dark accelerators; Extragalactic objects: AGN, GRBs; and more

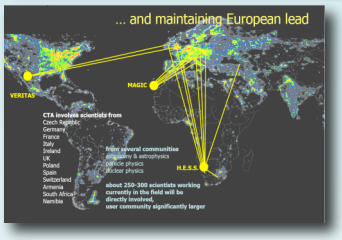




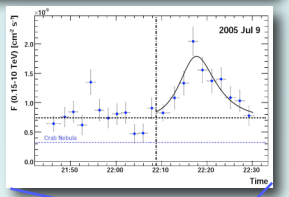


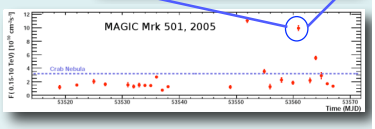






CTA will be the next step towards a multi-wavelength / multi-messenger approach





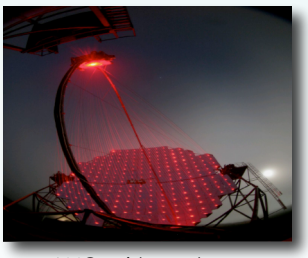
Planned contributions from Swiss Institutes:

Active Mirrror Control Geigermode APDs 2GHz FADC Readout Data Center

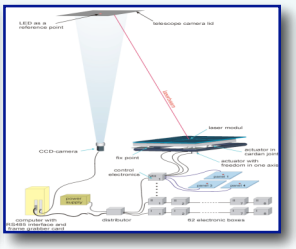
Active Mirror Control (AMC): ETH Zurich

Advantages if each segment of the reflector can be oriented individually:
- reduced constraints on rigidity of support structure (as in MAGIC)
- possibility to adapt focal length to observation (zenith dependent distance to shower maximum)
- monitor and correct alignment of each individual segment
- monitor reflectivity of each individual segment

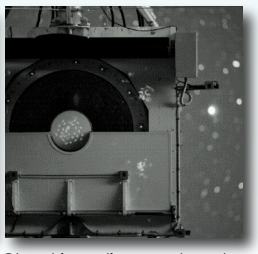
Recently, the ETH-group has significantly improved the stability and optical quality of the MAGIC Telescope and is now building the AMC for MAGIC-II



AMC guidance-lasers (for calibration only)



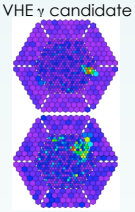
MAGIC AMC Principle

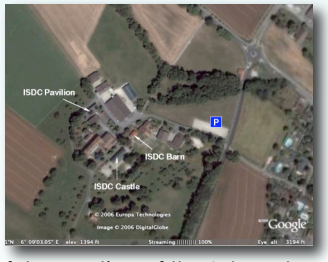


Checking alignment and reflectivity of ~30 mirror tiles

Data Center: Geneva University, ISDC

During large fraction of observation time, CTA shall be operated as open observatory. Since calibration and data-analysis is complicated, there is a need for a data-center to preprocess and distribute unprecedented amount of data.

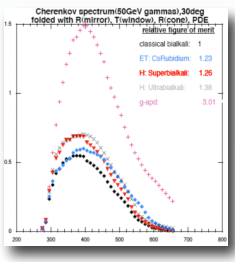




The very successful operation of the *Integral Science Data Center* (ISDC) can serve as an ideal model

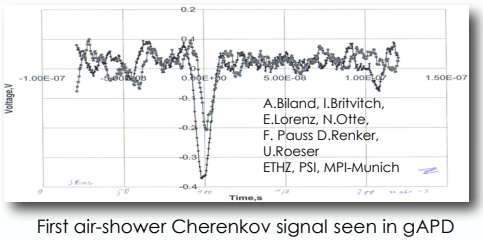
Geigermode APDs (gAPD) as photon sensors: PSI, ETH Zurich

gAPDs have potentially much higher photon detection efficiency than PMTs. First prototypes are available, first tests show very promising results.



Estimated photon detection efficiency of gAPDs and high-QE PMTs.

gAPD: factor >2 improvment compared to PMTs



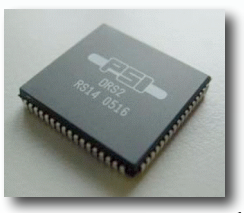
First air-shower Cherenkov signal seen in gAPD (PSI/ETH/MPI-Munich test in MAGIC)

Readout System: PSI

Several 1000 photon sensors must be read out with high trigger rate, high sampling rate, low power consumption and limited space.

Domino Ring Sampler (DRS) Chip developed by Stefan Ritt (PSI) looks ideal for the task:
- 2GHz sampling,
- 10-12bit dyn. range,
- 1024 samples deep

(will be used in MAGIC-II readout)



ETH Institute for Particle Physics

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