Executive summary

The Cherenkov Telescope Array: layout, design and performance

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The Cherenkov Telescope Array (CTA) will be the next generation very-high-energy gamma-ray observatory. CTA will be composed of more than 50 imaging atmospheric Cherenkov telescopes and will be built at two sites located on the island of La Palma (Spain) and near Paranal (Chile). CTA will be sensitive to gamma rays in a wide energy range, from 20 GeV to beyond 300 TeV, thanks to the use of three types of telescopes of varying sizes.

The telescope simulation models used in previous CTA performance studies were updated and new performance estimates were derived. The northern site of CTA is expected to be about five times more sensitive than MAGIC and VERITAS, while the southern site is expected to be an order of magnitude more sensitive than HESS. This will provide the capability to e.g., perform deep surveys of various sky regions.

The short-term sensitivity of CTA will be a few orders of magnitude better than that of *Fermi*-LAT. This would enable the measurement of very-fast variability in active galactic nuclei flares and increase the likelihood of detecting short-timescale transient phenomena like gamma-ray bursts or black-hole mergers.

The angular resolution of CTA is expected to reach around one arc minute at energies above 20 TeV. This, together with the large field of view (4.5° – 8.5°), will enable detailed imaging of extended gamma-ray sources. The exceptional energy resolution of CTA, reaching around 5% at 1 TeV, will make it easier to measure spectral cutoffs and detect spectral features such as those expected from dark matter.

Performance estimates for various CTA telescope layouts are presented in this contribution. The differences between the sensitivities of the layouts in the southern site are of the order of 20% at energies above 1 TeV. Differences in angular resolution are less than 0.01° around 10 TeV and those in the energy resolution are negligible.