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The Cherenkov Telescope Array: key science projects and multi-wavelength synergies

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The Cherenkov Telescope Array (CTA) will be the next generation gamma-ray observatory, open to the scientific community, to investigate the very high-energy emission from a large variety of celestial sources in the 20 GeV - 300 TeV energy range. The full array, distributed over two sites, one in the northern and one in the southern hemisphere, will provide whole-sky coverage and will improve the sensitivity with respect to the current major imaging atmospheric Cherenkov arrays (H.E.S.S., MAGIC and VERITAS) by a factor of five to twenty, depending on the energy. The large variety of science topics that CTA will investigate, from Galactic to extra-galactic sources up to fundamental physics, are addressed by means of nine Key Science Projects (KSPs) and one dark matter Programme. A particular emphasis will be put on major projects providing legacy data-sets, such as surveys and population studies, and the investigation of a few iconic classes of objects, such as gamma-ray bursts, clusters of galaxies, and cosmic accelerators. We review the current status of the CTA project, introducing the highlights from the telescope prototypes and discuss the main CTA Key Science Projects which will focus on those scientific cases that will greatly benefit from a multi-wavelength approach, involving the major facilities available at the time of the CTA scientific operations.

Presenter: VERCELLONE, S.