



Contribution ID: 11

Type: **not specified**

CTAO –the World’s largest ground-based gamma-ray observatory

Wednesday, 3 November 2021 08:40 (20 minutes)

Very-high-energy (VHE) gamma-ray astroparticle physics is a relatively young field, and observations over the past decade have surprisingly revealed almost two hundred VHE emitters which appear to act as cosmic particle accelerators. These sources are an important component of the Universe, influencing the evolution of stars and galaxies. At the same time, they also act as a probe of physics in the most extreme environments known - such as in supernova explosions, and around or after the merging of black holes and neutron stars. However, the existing experiments have provided exciting glimpses, but often falling short of supplying the full answer. A deeper understanding of the TeV sky requires a significant improvement in sensitivity at TeV energies, a wider energy coverage from tens of GeV to hundreds of TeV and a much better angular and energy resolution with respect to the currently running facilities. The next generation gamma-ray observatory, the Cherenkov Telescope Array (CTA), is the answer to this need. In this talk I will present this upcoming observatory from its design to the construction, and its potential science exploitation. CTAO will allow the entire astronomical community to explore a new discovery space that will likely lead to paradigm-changing breakthroughs. In particular, CTA has an unprecedented sensitivity to short (sub-minute) timescale phenomena, placing it as a key instrument in the future of multi-messenger and multi-wavelength time domain astronomy. I will conclude the talk presenting the first scientific results obtained by the LST-1, the prototype of one CTA telescope type - the Large Sized Telescope, that is currently under commissioning.

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Session Classification: The Cherenkov Telescope Array Observatory (CTAO): chair N. Tothill