

CTA Project Status (including operations)

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CTA Observatory gGmbH

The CTA Project



- Design and construct the Cherenkov Telescope Array (CTA) as an international observatory for ground-based gamma-ray astronomy
 - With much increased performance over existing instruments
 - Two observation sites, one in each hemisphere to cover the full sky
 - CTAO Headquarter and Science Data Management Centre (SDMC)
- Operate the observatory for an envisaged lifetime of 30 years
 - Data preservation at least until 10 years after CTA decommissioning



Scope of CTA – Baseline and Threshold (Cta

- Baseline configuration: the full array
- Implementation threshold: start construction when 62% of funding is available

		CTA Baseline Configuration	CTA Implementation Threshold *
Northern Array	LSTs	4	4
	MSTs	15	5
Southern Array	LSTs	4	0
	MSTs	25	15
	SSTs	70	50
TOTAL		118	74

* Number of telescope may vary depending on Cost Book update and initially available funding

The CTA Observatory System



CTA will be the first gamma-ray observatory with many telescopes and auxiliary instruments, to be built in a complex partnership (plus 4 sites)

- CTA is much larger than existing experiments
 - Scale factor of ~20, from 5 to 100 telescopes
 - Need to adapt (system) design and way of building and managing CTA
 - Simplification, more formal way of working (reviews, documentation, ...)
- Observatory type operation over 30 years a change of paradigm
 - Current gamma ray instruments are built and run as experiments
 - Impacts many aspects of CTA
 - e.g. CTA will be operated by staff who has not designed and built it

CTA Overall Project Status - 1



- CTA subsystem designs and prototyping very advanced
 - Multiple prototypes for telescope structures and cameras existing
 - Harmonization and simplification activities underway
 - Detailed system design is being worked out
- CTA-North Site (La Palma, Spain)
 - LST1 has been built currently in commissioning phase
 - Infrastructure work for additional telescopes starting soon
- CTA-South Site (Chile)
 - Site Agreements signed in Dec 2018
 - Aim to start with site infrastructure construction soon

CTA Overall Project Status - 2



- CTA is preparing for full construction, including
 - Systems engineering activities
 - Site infrastructure activities
 - Telescope structure and camera prototype testing
 - Software development
- The CTA Observatory (CTAO) is busy with programmatic, legal and systems engineering aspects towards full CTA construction
 - System definition, cost book, schedule, legal entity, ...
 - Currently strengthening its Project Office for CTA construction

CTAO Headquarter in Bologna





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The CTA Observatory (CTAO)



- In 2014, the CTA Observatory gGmbH was founded as interim legal entity, located at Heidelberg (DE)
 - To prepare the CTA implementation (select and prepare the two array sites and the Science Data Management Centre)
- The final legal entity for full construction, the CTAO ERIC (= European Research Infrastructure Consortium), is being set up under European Union law
 - Phase 1 application submitted to European Commission in March 2019













CTA Construction Project Organization



In-Kind Contributions

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- Up to 75% of CTA will be built with In-Kind Contributions (IKCs)
- IKC agreements between CTAO and the IKC provider will be placed once the ERIC has been established
- Three models of Work Package management, with different responsibilities, depending on the deliverable





SST harmonization process __ underway (MSTs to follow)



Camera Prototypes (SST, MST, LST)





CTA-North Site Observatorio Roque de los Muchachos La Palma, Spain

CTA-North Site Observatorio Roque de los Muchachos La Palma, Spain





CTA-North Observatory – Status Overview

- LST-1 being commissioned by LST consortium
- Infrastructure construction (phase 1) initiated
 - Three more LST foundations, one MST foundation
 - Roads, data and power network
 - Tendered by Instituto de Astrofisica de Canarias (IAC) in collaboration with CTAO
- CTAO building up its organization on La Palma
 - North Site Manager in place since 1 Jan 2019









Harsh Conditions – LST1 on 6 Feb 2018



CTA-South Hosting Agreements



Three agreements signed in December 2018 in Santiago de Chile







Chilean Ministry of Foreign Relations – ESO

ESO – CTAO

CTAO – CONICYT

CTA-South Hosting Agreements



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CTAO-ESO kick-off meeting about CTA implementation was held in Chile in March 2019

CTA-South Site – Atacama Desert ESO Paranal

Centro Armazones E-ELT

Cherenkov Telescope Array Site

Vulcano Llullaillaco 6739 m, 190 km east

and the second s

Cerro Paranal Very Large Telescope

CTA-South Site











CTA-South Site









CTA-South Site Investigations



- Geotechnical study carried out in 2017
- More detailed seismic investigation needed
- Imminent nomination of South Site Manager





SDMC Setup in Zeuthen



- Planning for a new SDMC building by DESY as part of campus master plan
 - Temporary SDMC housing has been made available ("Seevilla")

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A New Building for the SDMC



Winners of the architects' competition for DESY campus development were announced on 11 March 2019



Credit: Heinle Wischer und Partner Freie Architekten GbR, Berlin, with Ulrich Krüger Landschaftsarchitekten, Dresden

From construction to operation



- Aim to produce science as soon as possible
- Co-existence of construction, commissioning and Early Science during several years



Observatory Operations



- CTAO is responsible for CTA operations and data delivery
 - Science operations: on-site and off-site
 - Technical operations: preventive and corrective maintenance
- CTA-South array will be operated by ESO on behalf of CTAO
 As specified in CTA-South Hosting Agreement
- CTA science time users
 - CTA Consortium
 - Open time, proposal based
 - CTA hosts (IAC, ESO, Chile)







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CTA Data Flow and Software Systems





CTA Data Flow and Software Systems







Conclusions

- CTA will be a major new international user facility for gamma ray astronomy, with high performance
- CTA is preparing for full scale construction of the observatory

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CTAO and the international CTA collaboration gratefully acknowledge financial support from the CTAO Shareholders and agencies and organizations listed at http://www.cta-observatory.org/consortium_acknowledgments

