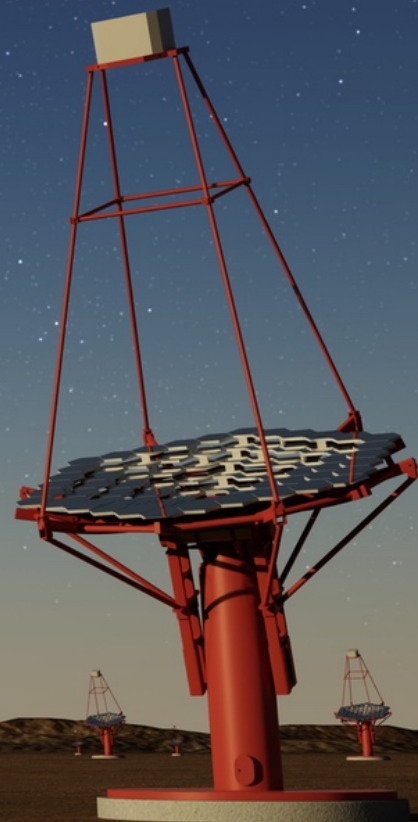


# Hands-on Session

Ulisses Barres de Almeida

Brazilian Center for Physics Research (CBPF)



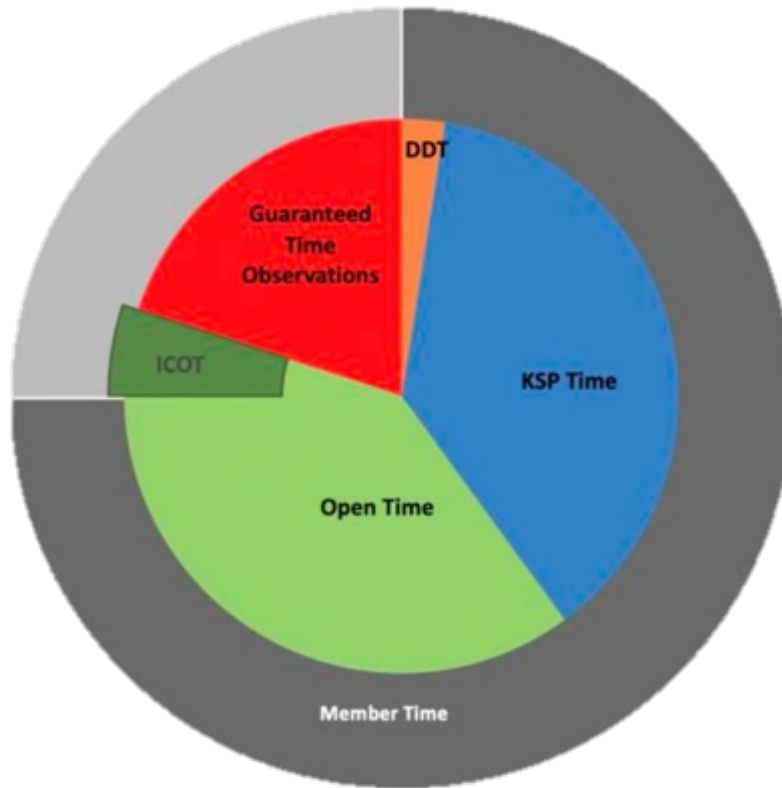
# Multi-wavelength / multi-messenger Hands on Session

CTA Key Science Projects

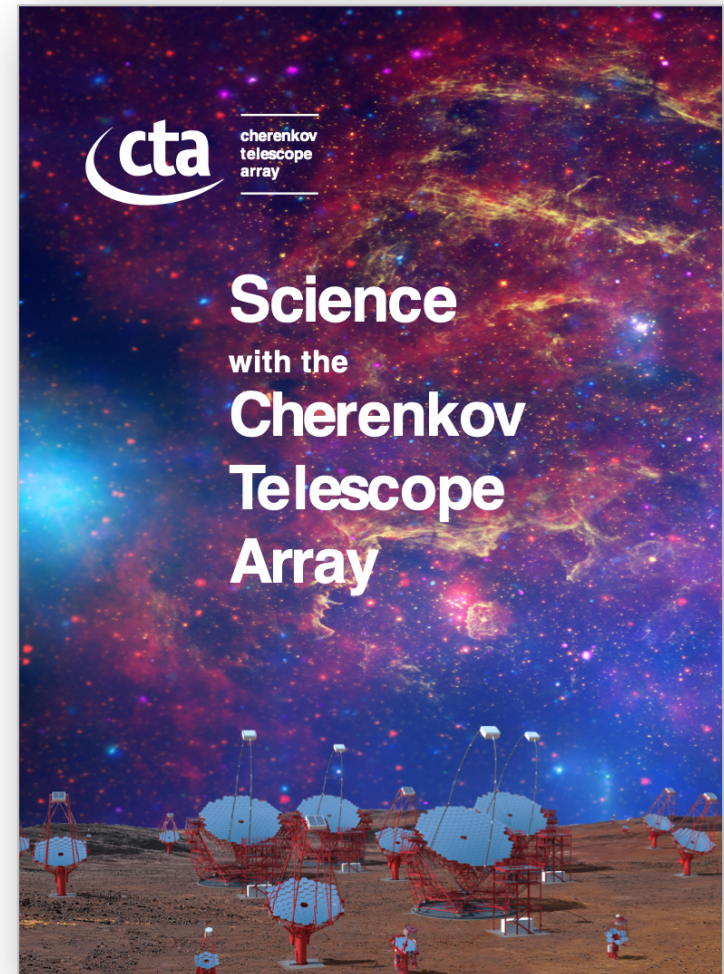
MWL / MM Needs

MWL / MM Coordination Planning

# CTA Key Science Projects



Categories of  
observing time



# CTA Key Science Projects



1. Dark Matter Programme
2. Galactic Centre
3. Galactic Plane Survey
4. Large Magellanic Cloud Survey
5. Extragalactic Survey
6. Transients
7. Cosmic-ray PeVatrons
8. Star-forming Systems
9. Active Galactic Nuclei
10. Cluster of Galaxies
11. Beyond Gamma Rays

Surveys

Key objects





# CTA Key Science Projects



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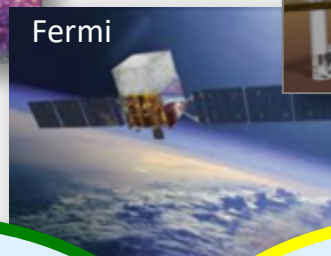
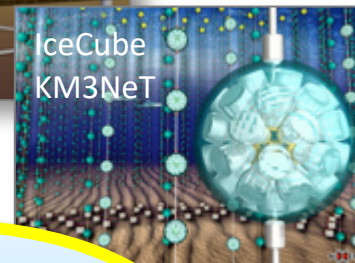
Surveys

Key objects

**Pick a topic and organize yourselves in affine groups**



# The MWL and MM Scene



Target  
selection  
& ToOs

Object  
characterization

Wide-band /  
MM SED



# MWL and MM needs of CTA



Band or Messenger	Astrophysical Probes	Galactic Plane Survey	LMC & SFRs	CRs & Diffuse Emission	Galactic Transients	Starburst & Galaxy Clusters	GRBs	AGNs	Radio Galaxies	Redshifts	GWs & Neutrinos
Radio	Particle and magnetic-field density probe. Transients. Pulsar timing.	●	●	●	●	●	●	●			●
(Sub)Millimetre	Interstellar gas mapping. Matter ionisation levels. High-res interferometry.	●	●		●	●	●	●	●		
IR/Optical	Thermal emission. Variable non-thermal emission. Polarisation.	●	●		●	●	●	●	●	●	●
Transient Factories	Wide-field monitoring & transients detection. Multi-messenger follow-ups.				●		●	●			●
X-rays	Accretion and outflows. Particle acceleration. Plasma properties.	●	●	●	●	●	●	●	●		●
MeV-GeV Gamma-rays	High-energy transients. Pion-decay signature. Inverse-Compton process	●	●		●	●	●	●	●		●
Other VHE	Particle detectors for 100% duty cycle monitoring of TeV sky.	●	●		●	●	●	●			●
Neutrinos	Probe of cosmic-ray acceleration sites. Probe of PeV energy processes.	●	●	●		●	●	●			●
Gravitational Waves	Mergers of compact objects (Neutron Stars). Gamma-ray Bursts.						●				●



**Spatial  
Coordination  
for Surveys**

**Extension of  
Spectral  
Coverage**

**Catalogue cross-  
matching for  
resolving  
counterparts and  
source ID**

**Temporal  
coordination for  
variable sources**

**Alerts for Transient  
Phenomena**

# MWL and MM needs of CTA

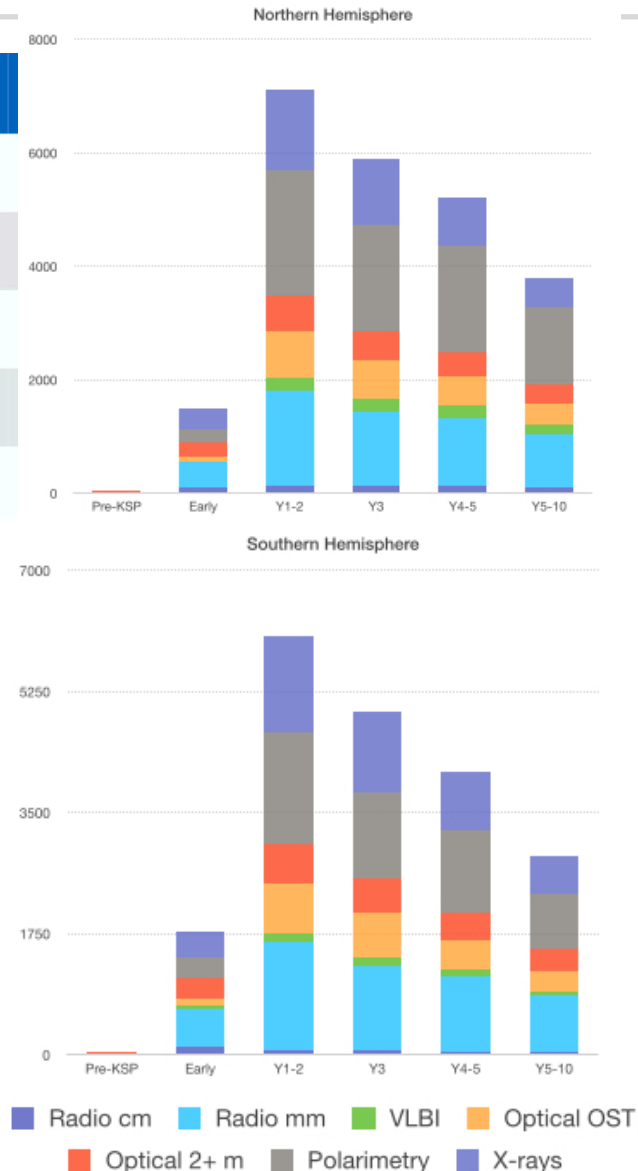


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Gravitational Waves	Mergers of compact objects (Neutron Stars). Gamma-ray Bursts.						●			



Use the Science with CTA book as a support for how your KSP is going to be implemented in CTA

<https://arxiv.org/pdf/1709.07997.pdf>





# Planning of a MWL/MM programme



## 1. Sketch your KSP Observation Programme with CTA (25 min)

- Science goals of the programme
- Key observational targets / sources
- CTA observational strategies (instrumentation, space, time)

## 2. Identify the MWL / MM data that are relevant to achieve the KSP science goals (25 min)

- Complementary wavebands / messengers
- Astrophysical constraints and probes
- Specific instrumentation available / required

## 3. Outline the directives for a successful MWL / MM Coordination (25 min)

- Data availability - what specific data can I actually get?
- Data accessibility - how to secure access to the data needed?
- Coordination - how to implement the required coordination?