

#### Management and control philosophy of the array

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### Introduction



- The **ASTRI Mini Array (MA)** consists of 9 dual-mirror telescopes of 4 m diameter and will use:
  - the Imaging Atmospheric Cherenkov Technique (IACT) approach to study high energy emission form galactic and extragalactic sources in the TeV band (up to >100 TeV).
  - Intensity interferometry to study stellar sources with unprecedented angular resolution.
- The **ASTRI MA** will start activities at Teide Observatory in September 2022 and will continue for an initial period of four years, which could be extended in agreement with IAC for a further four years period.

# **Geographical Distribution**

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#### The ASTRI MA site at Teide: ASTRI MA @IAC La Laguna ٠ ASTRI administration and coordination Telescope Array ٠ Local Control Room @ office. ٠ **THEMIS** building The Array control room & ICT. Data Center @ IAC Teide Warehouse to store spare parts and tools. ٠ Parking spaces for service vehicles. Residencia CTRL room @ IAC INAF IN ITALIA TRIESTE Remote CT rooms TLANO PADOVA TORINO Array @ OT BOLUGNA EIRENZE NAPO On-Site ICT @ OT CTRL room @ OT PALERMO CATANIA

Data Analysis & Archive

# **Operations & Array Control**



The MA Oparations activities can be grouped in four categories:

- Science Operations
  - To produce data of high scientific quality
- Maintenance/Technical Operations
  - To ensure optimal performance and minimal technical downtime
- Safety and Security
  - Prevention from hazard for people and assets.
- Outreach
  - promoting ASTRI mini array capabilities and results

# **Science Operations Cycle**





## **Operation SW deployement**





# **Science operation principles**



- Night Science operations will be controlled from the remote control room located in La Laguna @ IAC.
- During the first 3 years of operations the ASTRI MA will be run as an experiment (Phase I). After this initial period the ASTRI MA probably will move towards an observatory model with a fraction of time made available to the community (Phase II).
- In Phase I the ASTRI MA observing time will be dedicated to a limited number of programs with clearly deined by the ASTRI Science team (see Stefano and Andrea talks).
- Target of Opportunity observations of interesting target will be managed manually (reaction time can be of order of hours or longer)
- Coordinated observations with other IACTs Telescopes, e.g. LST, MAGIC, HAWC et al., could be possible. In particular simultaneous LST, MAGIC and ASTRI MA obesrvations could be possible and auspicated.
- No subarray operation is foreseen for the ASTRI MA.
- No real time analysis of the data is foreseen but only a data quality check. All data will be transferred (in quasi-streaming mode) for archiving and processing at the ASTRI Data Centre in Rome
- No array trigger (stereo trigger) will be implemented on-line. The search for multi-telescope triggers will be performed via software off-line at the Rome ASTRI Data Centre.

### **Observation Preparation/Dissemination**





### **Observation Execution**





# **On-Site Operation Modes**



- NIGHT: normal/science operation of the ASTRI MA, no persons are foreseen on site at the Teide Observatory.
- DAY: maintenance operations, during daytime, 2 to 3 persons will be present on site occasionally.



#### The On-site Array Control & Data Acquisition 🛽 🔊 🗌 **System**





**Mini-Array** 

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Duty

«USP»

### **Data Processing**



cmp Data Processing System «flow» Camera Data Model «subsystem» 8 Cherenkov Camera Preprocessing 8 «service» **Bulk Archive** RO.CAM DLO.CAM DL2 «use» DLO FITS --> 包 DL1 «service» Science Archive IRF3 RO.CATV DLO DID «flow» Science Data DL3 DL4 Model «flow» «flow» binary  $\overline{\Lambda}$  $\wedge$ IRF3 EVT1 «flow» CAL1 «flow» «flow» V DL2 V DL3 «flow» DL4 DL1 IRF3 «System» Science Data A «flow EVT0 EVTO.TRIG «flow» | EVT4 V K Model Data Processing System IRE3 «flow» EVT0 EVTO.TRIG EVT4 IRF3 名 I «flow» «subsystem» «flow» Stereo Event Cherenkov Data «flow» «flow» Builder Scientific Analysis flow U/ EVT3 «flown» EVT3 «use» «Tool» A-SciSoft IRF3 EVT2 O EVT3 DL1.CAM EVT2 «subsystem» IRF DLO Cherenkov Data Analysis «subsystem» IRF2 **Cherenkov** Data EVTO.TRIG Calibration and GTI ->> IRF2 LUT Reconstruction GTI ~ -> «use» «flow» LUT LUT «flow» IRF2 «subsystem» 名 MC/LUT IRF Generation and IRF2 Performance Verification LUT «flow» LUT DL1 DL2 IRF2 «flow» IRF2 «flow» MC1 MC2 A O IRF2 «flow» LUT IRF2 8 8 «service» «System» 8 «service» Simulation Archive Simulation System <-CALDB «flow»

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### **Implementation Phases**



The On-site Operations (Telescopes+SW) will be implemented incrementally





### **Questions?**