

Terms of reference for Einstein Probe Science Topical Panels

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1. Introduction

1.1. Purpose and scope

This document outlines the Terms of Reference for ESA appointed scientists to the Science Topical Panels (STP) of the Einstein Probe (EP) mission.

1.2. Mission Summary

The Einstein Probe (EP) is a mission of the Chinese Academy of Sciences (CAS), in collaboration with the European Space Agency (ESA) and the Max Planck Institute for extraterrestrial Physics (MPE), Germany, dedicated to time-domain high-energy astrophysics. Its primary goals are to discover high-energy transients and monitor variable objects. To achieve this, EP employs a very large instantaneous field-of-view (3600 square degrees), along with moderate spatial resolution (FWHM ~ 5 arcmin) and energy resolution in the 0.5-5 keV energy band. EP has also the capability of performing fast and deep follow-up observations in the 0.3-10 keV energy band (effective area $2 \times 300 \text{ cm}^2 @ 1 \text{ keV}$; half-power diameter, HPD, ~ 30 arcsec), as well as of quick downlink of transient alert messages. The launch date is currently foreseen for late 2023.

2. Science Management of the Einstein Probe Mission

The EP Science Team (EPST) will be composed of scientists, appointed by CAS, ESA, and MPE (hereafter “the Parties”), that will form a single science team in 80-10-10% proportion (CAS-ESA-MPE). The EPST will include a Science Management Committee (SMC) and various lower-level Science Topical Panels (STPs). The STPs comprise appointed STP members and associate members.

The SMC includes members appointed by the Parties to manage the overall science exploitation of the EP mission. The SMC will consist of an Executive Board and up to 10 additional members. The Executive Board oversees and manages the SMC activities, approves topics of the STPs, and appoints the STP chairs and co-chairs. The other members of the SMC will consist of STP chairs (maximum of eight), one independent scientist appointed by MPE and one independent scientist appointed by ESA. CAS shall maintain the majority (>60%) of the members of the SMC.

3. Science Topical Panels (STPs)

The STPs report to the SMC. The STPs will focus on selected science topics, with their activities coordinated by one Chair and up to two co-Chairs. The following STPs have been agreed (more panels may be added at a later time if necessary):



- STP1: Tidal Disruption Events (TDEs) and Active Galactic Nuclei (AGNs).
- STP2: Fast extragalactic transients (including gamma-ray bursts (GRBs) and non-GRB transients).
- STP3: Multi-messenger astronomy (synergies with gravitational wave events and with neutrino events).
- STP4: Compact stellar objects (compact objects including stellar mass black holes, neutron stars, and/or white dwarfs in our Galaxy or in nearby galaxies; ultra-luminous X-ray sources).
- STP5: Observatory Science (topics not included in the above panels, e.g., stellar flares, supernova remnants, diffuse emission, Solar System objects; may be split into various subpanels).
- STP6: Follow-up observation activities (not a science panel, but rather a structure within the EPST; any STP members can be involved and contribute to the follow-up activities).

3.1. Remit of the Science Topical Panels

The remit of the Science Topical Panels is to:

- Develop and promote the EP science case in the areas assigned to each STP.
- Lead and/or participate in research projects by making use of EP observations and exploiting EP data. Collaboration among STPs is encouraged.
- Conduct studies on scientific or technical aspects in support of EP.
- Advise the SMC on observing strategies.
- Propose to the SMC, and implement after approval, policies to coordinate the research programmes and to assign projects/data to the EPST members. The leadership of the projects will be assigned to guarantee the agreed share (i.e., 80% of the EP operational time and/or of the projects/data is guaranteed to CAS, 10% to ESA, 10% to MPE).
- Provide advice to the SMC on publication policies (including scientific paper authorship), data rights, duration of proprietary period, exploitation strategies, etc.
- Monitor the scientific performance of the mission and evaluate the impact of any changes on the science return.
- Identify and coordinate external facilities for triggers, follow-up and joint observations for each area of science (linked to STP6).
- Comply with the rules and policies regarding the EP STP, data rights, and publication.

3.2. Assignment of Research Projects

The following rules apply to the assignment of research projects:

- In order to acquire EP data, and be assigned Principal Investigator (PI) of a scientific investigation, within a proprietary period, EPST members are requested to submit

proposals to the STP (co-) Chairs, describing their research plans of EP data exploitation. Regular scientific investigation proposals shall be submitted prior to launch, and later on a yearly basis (TBC) during the operative phase of the mission. Proposals of opportunity may also be submitted by STP members at any time during operations, to reflect new developments in the fields.

- Assignment, by STP Chairs/co-Chairs and approval by the SMC, of the PI of the scientific investigation making use of proprietary EP data will be based on the scientific merits and, if applicable, following assessment of feasibility of proposals from the EP Science Center.
- For proprietary Wide-field X-ray Telescope (WXT) data, only the WXT module or the detector chips with which the sources of interest for the projects are observed will be made available to the project PI, exclusive of the rest of the WXT modules/detector chips.
- Joint scientific data exploitation is encouraged among scientists of the EP Science Team (EPST). Members of the EPST have the right to take part in scientific exploitation of the data of projects led by other members regardless of the Parties – if approved by the STP chairs and the project PIs – and can co-author the publications if significant contributions are made, following the common practice of research. Author lists of all EP collaborative papers will be proposed by the project PI and approved by the STP chairs.

3.3. STP Membership

Membership of the Science Topical Panels abides by the following rules:

- Each STP shall be composed of scientific and/or technically experienced members. Globally, i.e., over the whole EPST, the number of members of the STPs shall follow the 80-10-10% distribution between CAS, ESA, and MPE. Members shall be appointed by the Parties. Note that the appointment procedure may vary from one Party to another. The Parties may change their EPST appointments at their own discretion, e.g., in the case of a change of Institute. If an EPST member leaves a Party, then the Party decides if it remains a member or not.
- Each STP member can join up to two STPs plus (or including) STP6. If a member wants to join more STPs, a justification is to be provided and to be endorsed by the SMC. SMC members can be (formal) member of any STP.
- Each STP member can bring in up to two Associate Members¹. Associate members cannot be research project leaders (i.e., be PI); only their sponsoring/supervising STP members have the right to be assigned EP data within the proprietary period. The STP member is

¹ For each STP membership slot, each Party will be allocated up to two Associate Member slots. Associate Members are junior scientists (e.g., undergraduate students, PhD students, postdocs, junior staff members) working under the supervision of and/or sponsored by an STP member. In principle an individual STP member may sponsor more than two Associate Members provided the total number of Associate Members does not exceed the above limit. It is up to the Party to decide how to distribute the Associate Member membership.



responsible for the conduct of their Associate Member(s) within the collaboration and for communicating their names to the STP and the SMC.

- Associate Members can join one STP plus (or including) STP6; if an Associate Member wants to join more STPs, a justification has to be provided and endorsed by the SMC. Associate Membership will cease if their sponsoring/supervising EPST member leaves the EPST. They may complete any projects that have been started while they are members of the EPST, with a time limit of up to one year after leaving [TBC].

3.4. STP chair/co-chairs

- There will be one chair and up to two co-chairs of each STP. It is advisable to have one of the chair/co-chairs to be from ESA or MPE.
- ESA and MPE will each propose up to three of their STP members to be panel chairs/co-chairs of the STPs. These chairs/co-chairs will be endorsed by the Executive Board of the SMC. Each party can define their nomination procedure individually.
- The chair will be member of the SMC.
- The chairs/co-chairs assign science projects and data exploitation (including Target of Opportunity observations) to EPST members (i.e., assign PI-ship).
 - Any reports on scientific results from EP proprietary data before formal publication will be approved by the relevant STP Chair (and the SMC). Submission of corresponding papers is also subject to approval by the relevant STP Chair/co-Chairs (and the SMC).

4. Further information on Einstein Probe

Additional information about the Einstein Probe mission can be found at:

- <http://ep.bao.ac.cn>
- Einstein Probe at ESA: <https://cosmos.esa.int/web/einstein-probe>