



CALL FOR A MEDIUM-SIZE AND A FAST MISSION OPPORTUNITY IN ESA'S SCIENCE PROGRAMME

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1. EXECUTIVE SUMMARY

The Director of Science of the European Space Agency (ESA) is soliciting the scientific community in ESA's Member States for proposals for both a Fast mission opportunity (to be launched around 2034 and with an estimated ESA Cost at Completion of 205M€ at 2025 economic conditions (e.c.)) and for a Medium-size mission opportunity (to be launched around 2041 and with an estimated ESA Cost at Completion of 670M€ at 2025 e.c.). The programmatic context for the present Call is described in Section 2 and the boundary conditions are described in Section 3. Endorsement by ESA's Member States for the proposals will be required as described in Section 4, while information on the science management concept to be included in the proposals is indicated in Section 5. The proposal submission process is based on a two-step approach as described in Section 6 and according to the timeline indicated in Section 7.

2. PROGRAMMATIC BACKGROUND

The long-term plan for the ESA Science Programme, Voyage 2050, was approved in June 2021, following a broad consultation of the scientific community and a peer review process, with final recommendations issued by an independent Senior Committee¹. The plan includes three Large (L) missions in selected science themes (Moons of the Giant Planets², From Temperate Exoplanets to the Milky Way, and New Physical Probes of the Early Universe) and a set of Medium (M) and Fast (F) missions.

In 2021, the Director of Science issued a Call for the M7 and F2 mission opportunities³. Presently, three finalists are under detailed study for the M7 launch slot: M-MATISSE, Plasma Observatory, and THESEUS, while for the F-class mission, ARRAKIHS has been selected⁴.

Through the present Call for missions the Director of Science solicits proposals from the scientific community for the competitive selection of both a Fast mission opportunity (to be launched around 2034) and a Medium-size mission opportunity (to be launched around 2041). The selection of the F- and M-missions is based on a competitive, peer-reviewed process.

¹ <https://www.cosmos.esa.int/web/voyage-2050>

² <https://www.cosmos.esa.int/web/call-for-expert-committee-for-moons-of-the-giant-planets/>

³ <https://www.cosmos.esa.int/web/call-for-missions-2021>

⁴ <https://www.cosmos.esa.int/web/call-for-missions-2021/selection-of-f2>

Proposals in all fields of space science will be considered for both the F-class and M-class missions.

In parallel to the present invitation, the Director of Science has issued an exploratory Call for a mini-Fast mission in ESA's Science Programme⁵.

3. BOUNDARY CONDITIONS

The proposals submitted in response to the present Call for missions must be compatible with the boundary conditions spelled out in the present section. More detailed technical information and boundary conditions are provided in the Annex⁶ to the present Call. Further clarification, if needed, regarding the requirements listed in the Annex can be provided to successful Step-1 proposers at the workshop mentioned in Section 6.2.

3.1 Payload provision

For both the F- and M-missions the ESA Cost at Completion (CaC) includes also the cost of the mission's nominal operations and can envisage a contribution to the payload, including the case of a mission with payload fully funded by ESA (à la Gaia). For the present Call, the management and system activities of large payload elements are foreseen to be under ESA responsibility (see Section 8.1.1 of the Annex). The relevant costs must be included in the ESA CaC.

3.2 Cost and schedule: F-class missions

The present Call solicits proposals for F-class missions with a ceiling to the ESA CaC of 205M€ at 2025 e.c. F-class missions are ESA-led missions. Therefore, proposals for contributions to partner-led missions will not be considered. Proposals with a cost to ESA exceeding the ceiling will not be considered. F-class missions will be implemented through a design-to-cost approach, and with a total development duration from the candidate selection to launch of less than 8 years. Assuming a mission adoption in 2030 the launch would take place around 2034.

⁵ <https://www.cosmos.esa.int/web/exploratory-call-mini-fast-mission-proposals>

⁶ ESA-SCI-F-MGT-MAN-002

3.3 Cost and schedule: M-class missions

The present Call solicits proposals for M-class missions with a ceiling to the ESA CaC of 670M€ at 2025 e.c. M-class missions are ESA-led missions. Therefore, proposals for contributions to partner-led missions will not be considered. Proposals with a cost to ESA exceeding the ceiling will not be considered. M-class missions will be implemented through a design-to-cost approach, and it is foreseen that a mission of typical M-class complexity would require a total development duration from the candidate selection to launch of less than 15 years. Assuming a mission adoption in 2032 the launch would take place around 2041.

3.4 Technology Readiness Level

Regardless of the implementation timescale and financial envelope, proposed missions must rely on technologies that will reach TRL 6 (ISO scale) by the end of the definition phase and before the mission adoption. Considering the limited time available between the selection of mission candidates following this Call and their adoption, the proposed missions must rely on technologies available at the time of the Call, although mission-specific technology verifications can be foreseen during the definition phase, as further detailed in the Annex.

3.5 Mission profiles

Any mission profile can be proposed in response to the present Call, as long as it fits the boundary conditions indicated above. The Annex provides guidelines and information for the proposers to elaborate F- or M-mission proposals that could fit these boundary conditions. These guidelines are in no way prescriptive, and deviations will be considered with no prejudice, conditional to the mission proposal being compatible with the boundary conditions of the present Call.

The launch of the selected mission shall consider the use of European launch vehicles as a baseline, consistent with ESA's policy, unless an international partner provides the launch vehicle on a no exchange of funds basis.

3.6 International collaborations

Contributions from international partners can be included in the F- and M-mission proposals submitted in response to the present Call. The proposed partnership scheme will be contingent on the confirmation of the international partner agencies to proceed.

4. PROPOSAL ENDORSEMENT BY ESA'S MEMBER STATES

ESA Science missions are, in general, collaborative undertakings between ESA and its Member States (as well as, in some cases, international partners). For the majority of missions, the relative share of responsibilities between ESA and its Member States is based on ESA procuring the spacecraft and the launch services, and being also responsible for the operations. Payload elements are in most cases procured under the responsibility of ESA's Member State agencies, with a varying degree of ESA involvement. The science ground segment of the missions is in most cases procured under the shared responsibility of ESA and its Member States, with ESA normally being responsible for the science operations and nationally funded consortia contributing to instrument-specific data processing and calibration activities. In some cases, the scientific data processing is almost entirely performed by nationally funded consortia (e.g., Gaia).

Proposers will have to clearly state the proposed share of responsibilities between ESA and its Member States (and potential international partners), by indicating which mission elements they propose to be procured under responsibility of ESA's Member States (and potential international partners) and which elements they propose to be ESA-procured. The proposal must define a Lead Proposer (who shall be the formal point of contact between ESA and the proposing team during the study phase for selected proposals), include a definition of the payload consortia and provide the foreseen distribution of tasks and responsibilities within them (in the "Management" section of the proposal).

Note that it is not planned to issue an "Announcement of Opportunity" for the payload of the missions selected for study. Hence (while susceptible to evolution if necessary) the payload consortia defined in the "Management" section of the proposal will be tasked with carrying out

the study activities for selected proposals. ESA intends to implement an enhanced consultation phase with its Member States (and if applicable, with international partners) after Step-2 proposal submission and prior to their evaluation.

Letters of Endorsement from ESA's Member States (and international partners, if applicable) will be required after the Step-2 proposal submission, according to the deadline indicated in Section 7. Proposers are strongly encouraged to interact with the ESA Member States already at the beginning of the Step-1 proposal phase to verify their readiness to support the proposal. The Letters of Endorsement will have to state the readiness of ESA's Member States to undertake the necessary action to secure funding for the study (subject to the mission selection), implementation, and operations of the nationally provided mission elements falling under their responsibility, contingent on the consolidation of the cost figures for all nationally funded mission elements.

The Letters of Endorsement will have to be addressed to the ESA Director of Science, and sent directly by ESA's Member States by email to the address:

endorsement-2025-call@cosmos.esa.int

It is understood that commitments by ESA's Member States of the complete set of mission elements proposed to be nationally funded may not be achievable already at the time of the submission of the Letters of Endorsement. However, proposers must strive to demonstrate the funding and feasibility of the proposed payload complement and science operations elements by showing the presence of at least a "core consortium" (e.g., for astronomical telescopes with an integrated payload complement) or a "core payload complement" (e.g., for solar system missions featuring several individual instruments). It is understood that the funding scheme of the nationally provided mission elements may require consolidation during the study phase prior to the mission selection.

Assessment of the adequacy of the proposed consortium as demonstrated by its preliminary definition, including a distribution of tasks and responsibilities within the consortium supported

by the submitted Letters of Endorsement will form an important part of the proposal's technical and programmatic evaluation.

5. SCIENCE MANAGEMENT

Proposers must clearly explain their science management concepts, including their proposed approach to data ownership, broad community involvement, and division of mission responsibilities between ESA, its Member States, and the international partners (if applicable). Acceptance of a proposal does not constrain ESA to adhere to the proposed scheme, which will however constitute a starting point for the selected mission. For the selected mission a Science Management Plan will be prepared by ESA in coordination with a mission Science Study Team; this plan will undergo review by the ESA Science Advisory Structure⁷ and approval by the Science Programme Committee (SPC) by the time of mission adoption.

6. PROPOSAL SUBMISSION STEPS

The selection will be based on a two-step proposal process. Following reception of the Step-1 proposals (see Section 6.1 for details) a first technical and scientific screening of the proposed mission concepts will be performed by ESA with respect to the technical and programmatic feasibility aspects and by a scientific peer review committee, under the responsibility of the ESA Science Advisory Structure, with respect to the scientific goals.

An on-line briefing to prospective proposers has taken place on 11 December 2024⁸. The goal of the briefing was to anticipate the present Call to provide preliminary clarifications on the scope of the proposals, the expected information, possible international cooperation schemes, possible payload provision schemes, etc.

Proposers whose Step-1 proposals will have been considered likely to meet the technical feasibility and whose science case will be considered sufficiently competitive by the scientific peer review will be invited to participate in a workshop in anticipation of the Step-2 proposal submission (see Section 6.2 for details). The workshop will include a plenary session and one-

⁷ <https://www.cosmos.esa.int/science-advisory-structure>

⁸ <https://www.cosmos.esa.int/web/call-for-missions-2025/briefing-meeting>

to-one sessions between ESA and each individual team for seeking clarifications and providing feedback on the potential feasibility of their mission proposal. Following the workshop the proposers will be invited to submit a detailed Step-2 proposal (see Section 6.3 for details). However, F-mission proposals selected for Step-2 will undergo a two-months maturation phase before Step-2 proposals will be requested (see Section 6.2.2).

The Step-2 proposals will be subject to a detailed technical and programmatic screening by ESA for assessing their feasibility and consulting the potential partners to the mission during the evaluation phase. Following this technical and programmatic screening, the selection process will be based on the scientific merit of the proposals, assessed through a scientific peer review process under the responsibility of the ESA Science Advisory Structure. ESA will share the proposals with its Member State agencies and with SPC delegations, e.g., for the purpose of discussing their commitment, as well as, when applicable, with the proposed international partners. Therefore, ESA cannot ensure the confidentiality of the submitted material. Details of the personal data protection measures that apply to this Call can be found in the privacy notice on the submission website.

6.1 Step-1 Proposals

6.1.1 Content and submission of Step-1 proposals

The deadline for submission of Step-1 proposals in response to the present Call is stated in Section 7. Late submissions will not be considered; proposers are thus invited to submit their Step-1 proposals in advance of the deadline. Proposals will be accepted exclusively in electronic PDF format, submitted via the interface available at

<https://www.cosmos.esa.int/web/call-for-missions-2025>

Step-1 proposals will be limited in length to 10 A4 pages, with a minimum font size of 11 pt, and a maximum file size of 50 Mbytes. Proposals with file size in excess of this limit will be rejected by the submission system.

Step-1 proposals must contain all the information indicated below. Proposals missing one or more of the indicated elements may fail the initial technical, programmatic, and scientific screening. The suggested number of pages for each topic is indicative. Proposers are thus free to give more emphasis to one topic with respect to others. However, the total number of pages in the proposal is a hard limit; proposals exceeding the total page limit will not be considered for evaluation.

Step-1 proposals must be structured to contain the following information:

- Cover page: including which mission type (M-class or F-class) the proposal is intended for, the proposal title, and name and full contact information of a Lead Proposer;
- Back cover page: List of core team members (only names and institutions) insofar as known/available;
- Section on scientific goals of the mission (3 pages);
- Mission configuration, including mission profile, payload/instrument configuration, technology, etc., with specific reference to the boundary conditions indicated in Section 3 (3 pages);
- Planned management structure, payload consortia composition and expected main funding agencies involved in the payload provision and contribution to the science ground segment, including eventual (if applicable) proposed international collaboration elements (2 pages).

It is understood that the proposal's structure and content may evolve between submission of the Step-1 proposal and submission of the Step-2 proposal, e.g., in terms of detailed technical configuration, payload consortia composition, or presence of possible international partners. The Lead Proposer and the proposal's title identified in the Step-1 proposal, however, must remain the same throughout the process. Any further communication between ESA and the proposing team will only take place through the Lead Proposer. Failure to submit a Step-1 proposal by the deadline stated in Section 7 will prevent teams/proposers from the possibility of submitting a Step-2 proposal.

6.1.2 Evaluation of Step-1 proposals and following steps

Step-1 proposals will be subject to a technical and programmatic screening by ESA to evaluate their compatibility with the boundary conditions indicated in Section 3. Step-1 proposals that will have been considered likely to meet the technical feasibility will be subject to a scientific screening performed under the responsibility of the ESA Science Advisory Structure. The results of the Step-1 selection will be communicated to the competing teams and only proposers whose Step-1 proposals will have been considered likely to meet the technical feasibility and whose science case will be considered sufficiently competitive by the ESA Science Advisory Structure will be invited for the next step of the present selection process.

As done for the previous F-class mission Call⁹, when an F-mission proposal is deemed incompatible with the F-class mission Call boundaries, but is technically, programmatically and scientifically considered suitable for an M-class mission, the proposers will be invited to consider joining the M-class competition and participating in the workshop referred to in Section 6.2.1, according to the process and timeline indicated in this document for the M-class mission candidates.

6.2 Workshops in preparation for Step-2 proposals

6.2.1 M-class mission proposals

Proposers whose proposals will have passed the Step-1 selection will be invited to a dedicated workshop in preparation for Step-2 proposals.

The purpose of the workshop will be to discuss in detail, collegially but also with individual sessions for each team, the feasibility of the proposed candidate missions with the ESA engineering team, in advance of the submission of the Step-2 proposal (see Section 6.3.1 for details). The date and location of the workshop will be communicated to the Lead Proposers.

⁹ <https://www.cosmos.esa.int/web/call-for-missions-2021/>

6.2.2 F-class mission proposals

Two dedicated workshops (referred to hereinafter as workshop #1 and workshop #2) are planned for the F-class mission proposals that will have passed the Step-1 selection, separated by a maturation phase of about two months. The workshop #1 will be similar in format to the M-class mission workshop. F-class missions are characterised by a fast schedule that requires commitment from ESA's Member States (and international partners if applicable) from the very beginning to swiftly initiate the payload preparation activities for the candidate selected at the end of the process. To maximise the chances of retaining fully supported high-quality missions, ESA will invite its Member States to attend workshop #1 for them to consider potential payload contributions.

Following the workshop #1, the proposers will use the maturation phase to further consolidate their proposals, including for the payload contribution scheme, and to possibly already address some weaknesses identified by ESA. The workshop #2 will close the maturation phase and will allow the proposers to receive final feedback from ESA before submitting the Step-2 proposals.

6.3 Step-2 proposals

6.3.1 Content and submission of Step-2 proposals

The deadline for submission of Step-2 proposals in response to the present Call is stated in Section 7. Late submissions will not be considered; proposers are thus invited to submit their Step-2 proposals in advance of the deadline. Proposals will be accepted exclusively in electronic PDF format, submitted via the interface available at:

<https://www.cosmos.esa.int/web/call-for-missions-2025>

Step-2 proposals will be limited in length to 50 A4 pages (not including annexes), with a minimum font size of 11 pt, and a maximum file size of 100 Mbytes (including annexes). Proposals with file size in excess of these limits will be rejected by the submission system. Step-2 proposals not preceded by a corresponding Step-1 proposal that has passed the Step-1 screening will not be considered.

Step-2 proposals must contain all the information indicated below. Proposals missing one or more of the indicated elements may fail the technical and programmatic screening. The suggested number of pages for each topic is indicative, unless otherwise stated. Proposers are thus free to give more emphasis to one topic with respect to others. However, the total number of pages in the proposal is a hard limit.

Topics to be covered in the Step-2 proposal (and page limits) are:

- Cover page (1 page, mandatory limit): must clearly indicate which mission type (M-class or F-class) the proposal is intended for, the proposal title and the name of the Lead Proposer. Any other information is optional;
- Contact information page (1 page, mandatory limit): must clearly indicate the contact information for the Lead Proposer. The proposal must explicitly state the availability of the Lead Proposer to support the study activities by making available at least 20% of their time throughout the study period. Note that the Lead Proposer will be the formal point of contact between ESA and the proposing team throughout the study phase;
- Executive summary (2 pages, mandatory limit): should contain a summary of the proposal, allowing the reader to gain a preliminary understanding of the proposal's content upon reading;
- Science case (10 pages, suggested length): should clearly address the scientific rationale for the proposed mission, for example, by explaining the broad context, the progress in the relevant field that the proposed mission will achieve, the need to perform the relevant measurements from space, and the synergies – if any – with other facilities (ground- and space-based). Proposers should assume that the relevant readers will be scientists from other fields of space science, hence not necessarily experts in the field;
- Scientific and Mission requirements (5 pages, suggested length): should explain how mission science objectives flow into scientific requirements, what are the required measurements, and how these translate into instrument requirements and data calibration. For the missions selected at the end of Step-2 the information provided in this section will constitute the starting point for producing the Science Requirements Document, the Mission Requirements Document and the Payload Definition Document. Content of this section should be understandable by both scientists and engineers;

- Proposed scientific instruments (14 pages, suggested length): should explain, following on the definition of scientific requirements, what instrument(s) will be needed to achieve the required measurements. While the proposal is not intended to contain engineering blueprints, the information provided should allow readers to assess feasibility and maturity level of the proposed instruments. To allow a proper technical evaluation of the proposal the following information needs to be provided:
 - Measurement principle/detection concept;
 - Block diagram: main building-blocks and subsystems, including software;
 - Design description (down to major subsystems) and operating principle;
 - Performance budgets for critical elements;
 - Required resources: volume, mass, power, data transmission;
 - Specific/critical interface requirements to the spacecraft and environment constraints, e.g. accommodation, integration, cooling, pointing, contamination and cleanliness, radiation sensitivity, magnetic cleanliness, etc.;
 - Specific calibration needs (on ground and in orbit); and
 - TRL assessment per unit and relevant heritage.
- Proposed mission configuration and profile (10 pages, suggested length): should contain a description of the proposed mission needs, including the orbit, launch, etc., together with the system level requirements imposed by the mission concept (e.g., pointing requirements, Sun aspect angle constraints, specific observing modes and operation tools). Relevant options and trade-offs should be identified. A concept for the operations should be provided, describing the mission phases from launch to end of life (e.g., as relevant: observing strategy, measurement sequence, specific modes for science or calibration aspects, spacecraft disposal at end of life). Details of the spacecraft should be provided as far as available, including possible spacecraft design, requirements/description of major subsystems and estimation of spacecraft key budgets (possibly by benchmarking with previous missions);
- Management scheme (5 pages, suggested length): proposers should describe the proposed procurement scheme for all mission elements, indicating which elements are proposed to be ESA-procured and which procured by nationally funded consortia or international partners (if applicable). The consortia organisation and the distribution of tasks and responsibilities (work breakdown structure for the core team with key persons)

should be detailed, for both the Phase A/B and subsequent phases. Proposers are also invited to detail where relevant any specific task they believe should be achieved during the Phase A/B, in addition to the regular study activities, for the purpose of the mission selection. Proposers should describe the proposed science management plan, including data policy, community involvement, development of early career researchers, etc. (see Section 5);

- Risk assessment (1 page, suggested length): should include the description and assessment of technical and programmatic risks (including those associated to payload provision by partners contributing to the mission) and illustrate mitigation actions and potential backup options;
- Costing (2 pages, suggested length): while proposers are not expected to provide detailed costing information about the proposed mission, they should argue convincingly that it can be implemented within the relevant CaC ceiling (see Section 3), in particular if the proposed mission is deviating from the guidelines provided in the Annex to the present Call;
- Bibliography: not required but encouraged. The list of references can be included as an Annex; it will not count against the page limits.

Details on Letters of Endorsement from ESA's Member State agencies are given in Section 4 and are mandatory by the deadline stated in Section 7.

6.3.2 Evaluation of Step-2 proposals and way forward

Provided that they are received by the deadline indicated in Section 7 and are supported by Letters of Endorsement from ESA's Member State agencies as indicated in Section 4, Step-2 proposals will be subject to a technical and programmatic screening by ESA, aiming at ascertaining the compatibility of the proposed mission with the Call's boundary conditions. Step-2 proposals which will be found to be incompatible with the Call's programmatic boundaries, or which do not provide the required endorsement for the mission elements proposed to be nationally provided (or provided by international partners) will be marked as "unfeasible" and will not be subject to the scientific peer review. Step-2 proposals that are considered feasible will be submitted to a scientific peer review process conducted under the responsibility of the ESA Science Advisory Structure. Based on this evaluation, the ESA

Director of Science plans to select up to five M-mission candidates for a more detailed Phase-0 study and one F-mission candidate and one potential back-up for a study phase.

A written debriefing will be provided to all proposers, comprising in all cases a short technical and programmatic assessment of the proposal, as well as, for the proposals which were submitted to the scientific peer review, a scientific evaluation. Further details on the plans for the studies of the selected mission proposals and the further activities will be provided to the selected proposers.

7. DEADLINES AND SCHEDULE

All dates are subject to confirmation.

Activity	Date	
	M-mission Call	F-mission Call
Briefing for the community	Done on 11 December 2024 ¹⁰	
Release of Call	19 March 2025	
Step-1 proposal submission deadline	21 May 2025 – 12:00 (noon) CEST	
Step-1 proposal assessment	May – September 2025	
Step-1 proposer notification	End September 2025 (exact date TBD)	
M-class mission workshop and F-class mission workshop #1 ¹¹	October 2025 (exact dates TBD)	
Maturation Phase	Not applicable	October – December 2025
F-class mission workshop #2 ¹²		January 2026 (exact date TBD)
Step-2 proposal submission deadline	19 March 2026 12:00 (noon) CET	21 April 2026 12:00 (noon) CEST
Letters of Endorsement deadline	19 May 2026 12:00 (noon) CEST	16 June 2026 12:00 (noon) CEST
Proposal evaluation and scientific ranking	March – September 2026	April – October 2026
Selection of missions for study	November 2026 (up to 5 candidates)	November 2026 (1 candidate and 1 backup)

¹⁰ <https://www.cosmos.esa.int/web/call-for-missions-2025/briefing-meeting>

¹¹ Includes one-to-one sessions of ESA with proposing teams

¹² Includes one-to-one sessions of ESA with proposing teams