

# ESO Expanding Horizons White Papers Call: Current Status

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In July 2024 ESO launched the Expanding Horizons process to help the organisation define its next major undertaking after the Extremely Large Telescope. The first step of this process is to identify the major scientific questions that will drive the research of the astronomy community in the 2040s. A call for White Papers was issued to encourage discussion of Expanding Horizons as broadly as possible across the community, and to help the Senior Science Committee identify these key future astronomical questions. This article gives an overview of the submitted White Papers.

## Introduction

The goal of the Expanding Horizons process (Brinchmann et al., 2025) is to trigger dialogue about the key scientific questions that will face astronomy, and the disruptive technologies required to address them, in the 2040s. This in turn will help ESO in the selection of the next major facility to be developed once ESO's Extremely Large Telescope is completed. Since the initial announcement of the Expanding Horizons process, ESO has taken every opportunity to advertise it as broadly as possible, through an extensive communication campaign, via its web portal<sup>1</sup>, local media campaigns, presentations at National Astronomy Meetings, the European Astronomical Society, and on-demand at other meetings.

An important part of the process is the role played by the Senior Science Committee (SSC)<sup>2</sup>, appointed by ESO to give independent and unconflicted advice to the executive and the ESO Council on the scientific ambitions and technical feasibility of the new programme.

Figure 1. Career stage of up to the first three leading authors of White Papers

To further encourage community engagement in the Expanding Horizons process, ESO and the SSC issued a call in Q3 of 2025 for White Papers from the European astronomical community, specifically to outline the key science questions that will likely face European astronomy in the 2040s.

By the 15 December 2025 deadline 208 White Papers had been received by ESO. These span the gamut of astronomical science, ranging from niche themes to the broadest of scientific range, amply demonstrating the diversity and richness of ambition of European astronomy. As announced in the call, although the White Papers will not be made public by ESO, authors have been encouraged to disseminate their contributions by submitting to, for example, arXiv. Currently, approximately half of these papers have already appeared on the archive.

## Scientific ambitions

The SSC analysed all of the White Papers and met in person on 5 February 2026 to discuss their content in detail.

The primary focus of the discussion was on the scientific ambition and impact of the proposed science, but attention was also paid to whether the proposed science could be partially or fully addressed by other upcoming facilities. In addition,

the technological readiness and promising future technological developments were also considered.

The White Papers spanned a wide range in style, from papers purely focused on scientific questions to others arguing mostly for a facility. Despite the numerous single science cases, there were clear areas of coherence where many White Papers were submitted – sometimes needing different kinds of facilities to reach similar science goals.

Overall, the papers fell into five broad categories with roughly the same number submitted in each:

- Cosmic Expansion and Gravity
- Origin of the Elements
- Matter Under Extreme Conditions
- Galaxy Assembly and Regulation
- Planetary Systems and Habitability.

## Demographics of the submissions

As part of the submission process two optional questions were included (for statistical purposes only) to help ESO better understand the demographics of our community. Respondents could provide the career stage and the gender of up to the first three leading co-authors of each White Paper. As a result, such demographic data were submitted for 96% of the White Papers.

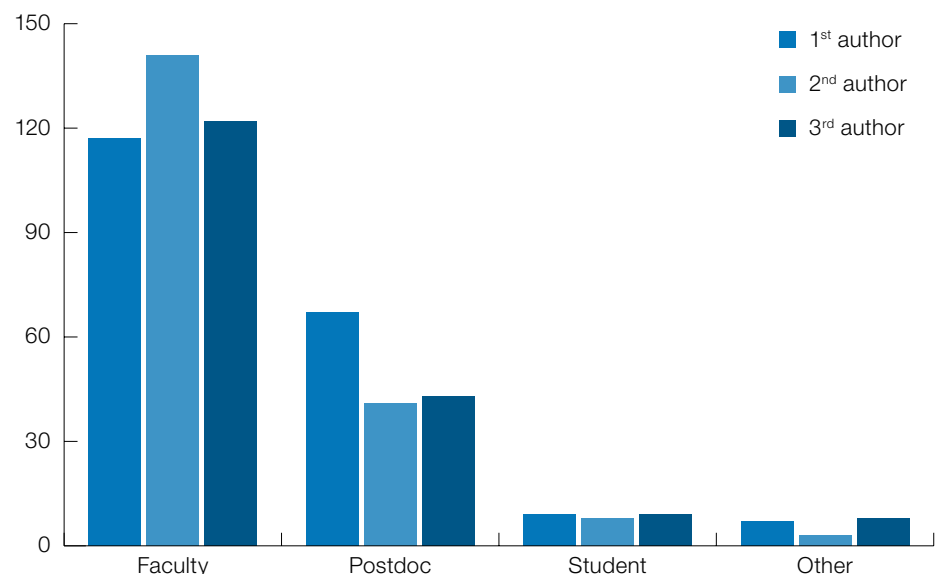


Figure 2. Gender of up to the first three leading authors of White Papers

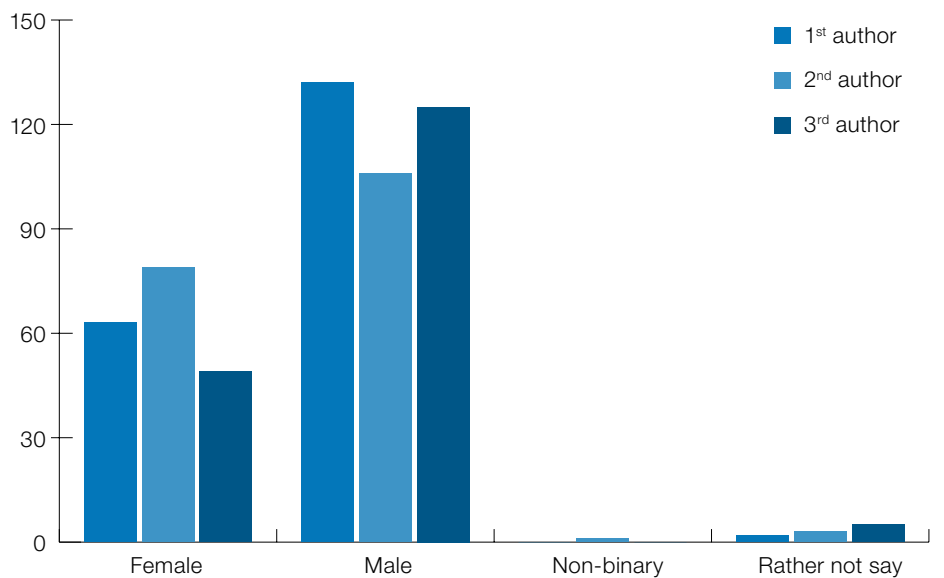
Figure 1 demonstrates that even though most of the White Papers were led by senior astronomers, an encouraging number of lead authors were at the post-doc stage of their career. This is a key demographic considering the long-term timescale of the facility that is to be selected following the Expanding Horizons process.

**Next steps**

Informed by the submitted White Papers, ESO and the SSC are now organising the first in a series of community workshops, scheduled for 13–17 July 2026, to be held in person at ESO’s Headquarters in Garching near Munich.

The primary goal of the “Expanding Horizons: What are the astronomical challenges of the 2040s” workshop<sup>3</sup> is to get the broadest engagement possible across the community, concerning both the science drivers as outlined in the White Papers, and facility needs.

The SSC hopes the workshop will help to identify overlapping goals and tools, as well as synergies across different scientific themes, leading to consolidation around specific facility concepts that will deliver the strongest scientific return to the European astronomical community.



Another important aspect of the meeting will be the discussion of the types of novel technical innovations that will be necessary to realise the new facility.

The structure of the workshop is currently envisioned to consist of a series of plenary talks covering the major scientific themes, interspersed with technology development talks, along with more dedicated splinter meetings.

It is expected that during this workshop ESO will launch the Call for Ideas for its next programme, ahead of the deadline for Letters of Intent, due on 1 December

2026. Further information will be provided on the Expanding Horizons website<sup>1</sup> and in particular in the FAQ section.

**References**

Brinchmann, J. et al. 2025, *The Messenger*, 195, 5

**Links**

- <sup>1</sup> Expanding Horizons website: <https://next.eso.org/>
- <sup>2</sup> Expanding Horizons Senior Science Committee: <https://next.eso.org/ssc/>
- <sup>3</sup> Workshop Expanding Horizons: What are the astronomical challenges of the 2040s webpage <https://www.eso.org/sci/meetings/2026/ExpH.html>

J. Looten/ESO



“...by the beauty of it all, to the point of forgetting everything around me,” says Julien Looten, a French astrophotographer. During his visit to ESO’s Very Large Telescope in Cerro Paranal, Chile, he captured this extraordinary image which reveals the astonishing impression he gained of one of the world’s darkest skies on Earth.