

# Summary of the long-term prospective meeting

25 April 2025 Nice-Valrose

D. Mourard



~20 participants for a 1-day  
brainstorming meeting on concepts,  
projects for the long-term future of  
optical interferometry





# Rationale

50 years after the first success by Antoine Labeyrie .... the successes of the past and current interferometric installations in the world demonstrate the great power ... to solving some of the most challenging questions in astronomy.

These successes have capitalized on the conceptual and instrumental developments made on many of the prototype installations. ... **long-term needs in the parameters space** (*sensitivity, resolution, imaging capability, field of view, ...*) require an in-depth analysis ... discussing the different approaches that have emerged in the framework of the long-term development of astronomy: **classical direct amplitude interferometry, intensity interferometry, heterodyne recombination, hypertelescope and direct imaging, nulling.**

This meeting follows the Specialist Discussion held in London in 2024. Beyond the frontier science drivers that were identified at that time, the first objective of this meeting is to **discuss the different possible concepts** and to **identify common technological challenges** that need to be addressed soon. The second objective is to put **astrophysical and programmatic questions in the context of the broader development of Astronomy at the horizon 2050.**

# Organisation of the meeting

- Setting the scene: summary of various past meetings, and European and US long term prospective
- **Poster session** (with discussions and summaries): 1/ *Intensity Interferometry*, 2/ *Heterodyne*, 3/ *Nulling*, 4/ *Amplitude and space interferometry*, 5/ *Hyper telescope and direct imaging*.
- Three parallel tables addressing the following questions:
  - Which performance matrix could we define for studying the strengths and weaknesses of the concepts, considering the main science drivers?
  - What is the impact of the instrumental parameters (base, Ntel, D,  $\lambda$ , ground/space... ) on the performance matrix and the space of parameters?
  - How to evaluate the future large projects (VLTI++, CHARA++, eVLTI, eCHARA, PFI, LIFE...) considering the outcomes of the previous session? What are the technological needs?
- Discussion, conclusions, way forward

# Spirit of the discussions/summaries

EU/US horizons are different, but both are considering a worldwide perspective

Main characteristics: Extragalactic, star, planets // Astrometry, Imaging, high dynamics

**P**hysics **F**rontiers **I**nterferometry

Three different approaches on the three different tables → questions are open and many ways to progress!

A strong wish for a 'lessons learned' exercise on the current facilities, for the question of transmission (telescope, transport, instrument) and probably other points.

Moving forward on VLTI++/CHARA++ is fine but setting, now, the foundations for the long-term (e-vlti, physics frontiers...) is critical and timely. No clear consensus yet for space apparently.

Future must be widely inclusive. Very favorable situation today, with solid demonstrations of knowledge and feasibility.

What next?

- Notes and summaries to be written soon, having in mind the EAS meeting in June, ESO Horizons, and US decadal

- Within a few months, turn that into a paper

- Publicize and open widely in the community

- Shared place for the documents (from all the past, current, and future meetings): [olbin2025???](#)

Organize broad, transatlantic continuous exchanges (ESO, NoirLab)....  
Dare exploring unconventional solutions (Quantum physics...)



**Credit Pierre Léna**