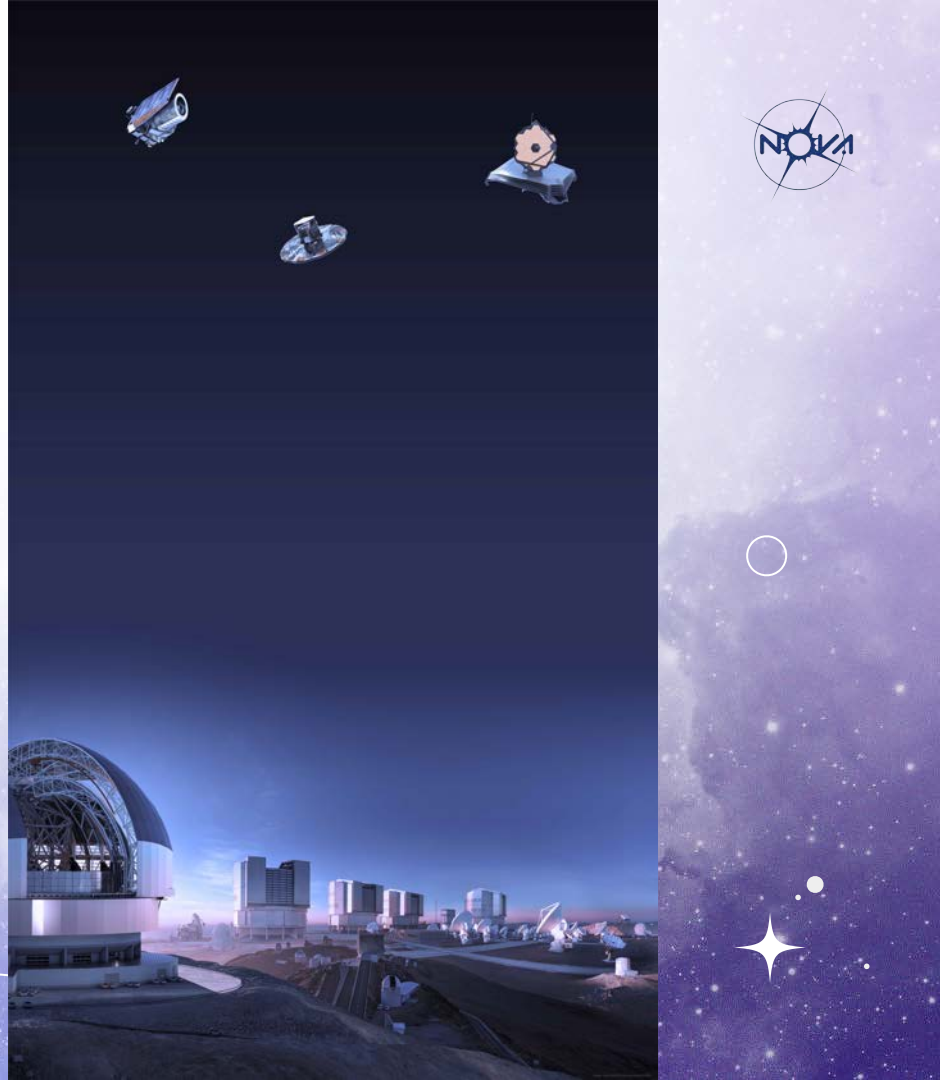


Future Instruments, Future Science: Opportunities for Dutch astronomy beyond 2030

Thomas Wijnen

Instrumentation Coordinator

*Netherlands Astronomy Conference
12 May 2026*



Science-driven instrumentation



- Scientific goals determine the focus of NOVA's instrumentation program
- Match with capabilities at
 - Op-IR instrumentation group
 - Sub-mm instrumentation group
 - NOVA institutes (data science)
- Large projects, timely strategic positioning and prioritisation
- Strong focus on ESO infrastructure



NOVA instrumentation program



- Instrumentation Coordinator:
 - Facilitator
 - Monitoring instrumentation program
 - Contact for instrumentation projects management and scientists
 - Identify opportunities
 - Instrumentation calls
- Long-term strategic planning for capabilities at instrumentation groups

ESO's growing landscape



- ELT
- Expanding Horizons
- VLT2030



VLT Beyond 2030



- VLT remains key capability
- VLT uniqueness:
 - VLT
 - Blue coverage
 - Survey power
 - Testbed for new technology
- Outside the box:
 - Data reduction/analysis software
 - Archives
 - Data mining (with ML)
 - Atomic/molecular data
- Need at facility level: equip all UTs with LGS + deformable mirrors



VLT Beyond 2030



Take home messages:

- Goal: Maintain VLT/I at the science forefront in the coming decades
- Aim: establish roadmap for VLT/I development beyond 2030
- ESO hardware contribution is up to 10 M€ per instrument

VLT Beyond 2030



White paper call (proposals):

- Launch: January 2026
 - Deadline: 15 January 2027
 - Assessment: Jan - Oct 2027
 - Two documents (max. 50 pages):
 - Science (most of the weight)
 - Technical (design/consortium/budget/management/impact)
 - Several proposals selected for Phase A and then down selection
 - Flexible program: different level of maturity (favour ideas at this stage)
-

VLT Beyond 2030 (discussed concepts)



	Instrument	Wavelength range	Resolution	Other
VIOLA (VIPA-based Instrument for Oxygen Loaded Atmosphere)	High-throughput, ultra-high-resolution spectrograph	J (1.1-1.3 μm) and H (1.45-1.65 μm) bands simultaneously	~ 300.000	Additional channel for simultaneous stellar monitoring
nirESPRESSO (VLT NIRPS-like instrument)	NIR high-resolution spectroscopy and RV follow-up	Y, J, H, and potentially K-band	~ 100.000	AO plus mono-mode fiber fed 0.5 m/s RV-precision
MICHELANGELO	Mid-infrared, adaptive optics fed, high dispersion spectrograph for exoplanetary atmospheres	L and M bands in single exposure	~ 50.000	
VIPER	Visible and Infrared spectroPolarimetER	330 - 1700(/2400) nm in single exposure	~ 100.000	Simultaneous recording of polarization (IQUV) 1 m/s RV-precision
RISTRETTO (Proposed visitor instrument)	High contrast (XAO) coronagraph (with 7 spaxels) and high resolution spectrograph	620 - 840 nm	~ 140.000	
HRMOS	Multi-object spectrograph	385 - 420 nm 480 - 525 nm 613 - 675 nm	~ 80.000	Factor 50 multiplexing Requires ADC 10 m/s RV-precision
SHARPS (Short-wavelength High Angular Resolution Phase-referenced Spectro-interferometer)	High sensitivity (J-band: 22 at R=100, 16 at R=30k) and high angular resolution (1 mas)	0.95 - 1.8 μm (Y, J and H-bands)	~ 100 (low) ~ 3.000 (medium) > 30.000 (high)	10 μs astrometric precision 10^{-5} contrast @ 50 mas 10^{-7} contrast @ 100 mas

ESO Expanding Horizons



- Next *transformational* facility after ELT
- Breakthrough astronomy in 2040's and beyond
 - New telescope facility at existing or new site
 - Significant upgrade of ESO (co-)owned facility
 - Other combinations
- Selection criteria
 - Scientific drive
 - Organisational ability
 - Sustainability
 - Institutional model
 - Risk assessment



Timeline



- Q3 2026 - 1 June 2027: Call for ideas (letter of intent before 1 Dec 2026)
- June 2027 - Sep 2028: Assessment phase
- Oct 2028 - Dec 2028: Decision



Expanding Horizons



ALMA2040

White papers
Concept proposal



TDT

White papers
Concept proposal



ATLAST

White papers
Concept proposal



WST

Conceptual design study



5th VLT UT at km distance



30/40m Telescope on La Palma

Upcoming conferences



- EAS annual meeting, 29 June - 3 July Lausanne
- SPIE Astronomical Telescopes + Instrumentation, 5-10 July Copenhagen
- Expanding Horizons conference, 12-17 July ESO Garching
- High Angular Resolution Science with Next-Generation Op-IR capabilities
1 - 4 September ESO Garching
- HWO2026 in Europe conference, Nov 30 - Dec 4 Paris

Thank you!



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