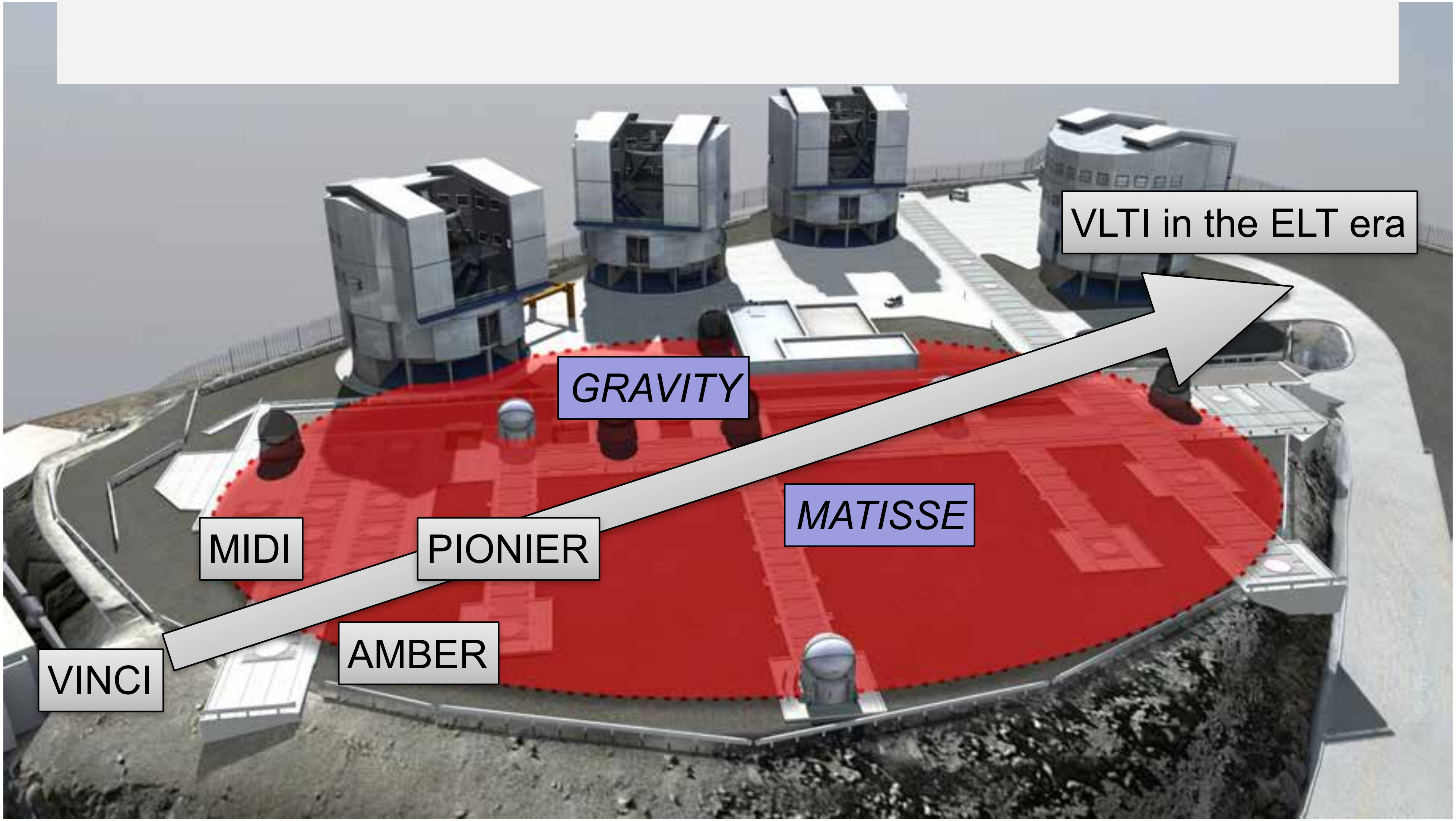
STATUS of the VLTI

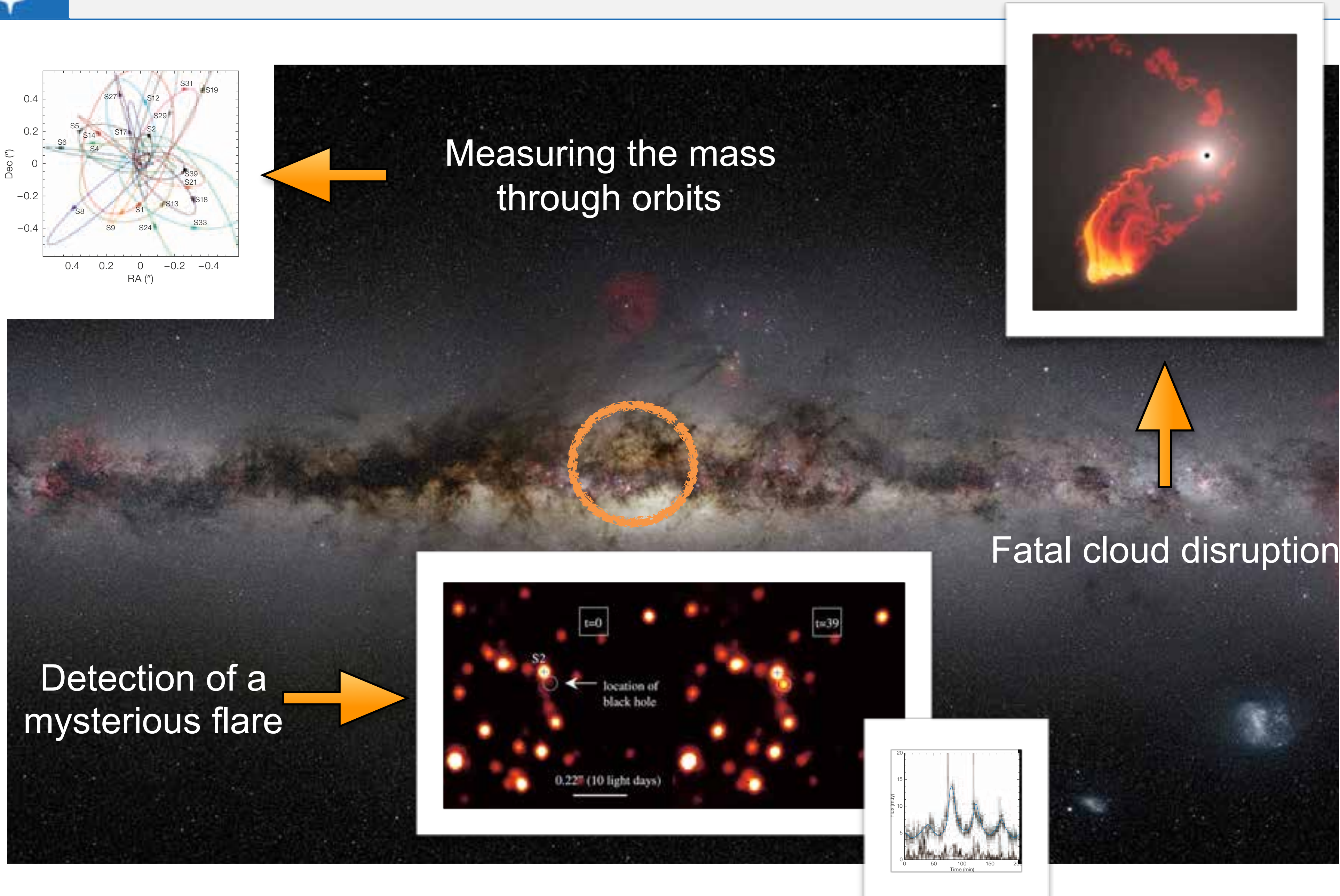
J.P. Berger
VLTI Programme Scientist
European Southern Observatory

STATUS of the VLTI

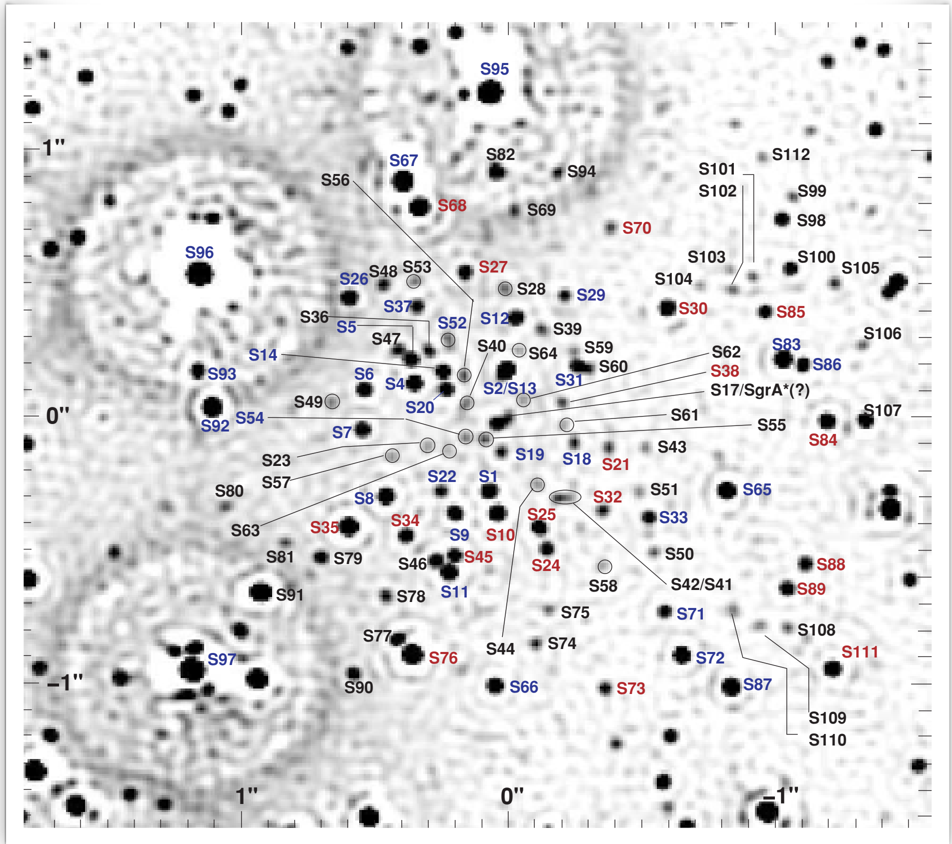


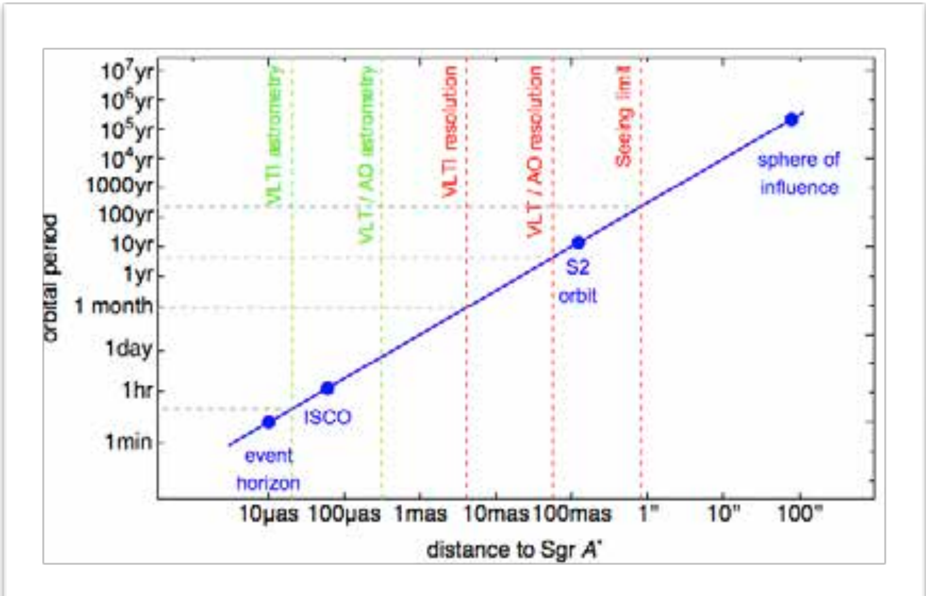
ON THE INSTRUMENTS & INFRASTRUCTURE SIDE

The Galactic Center

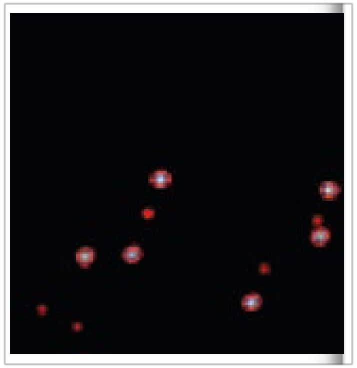


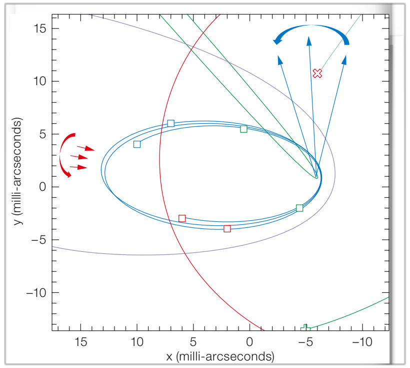
The closest we get the stronger the influence of the black hole





GRAVITY: pushing the frontiers of our knowledge in black-holes and fundamental physics.

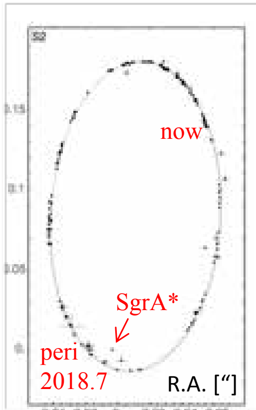


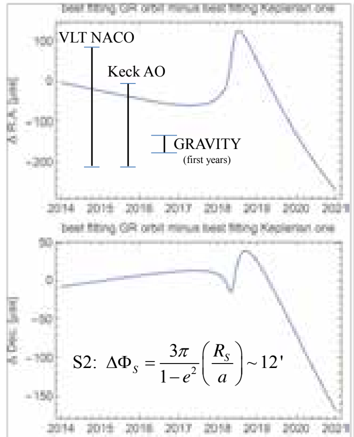


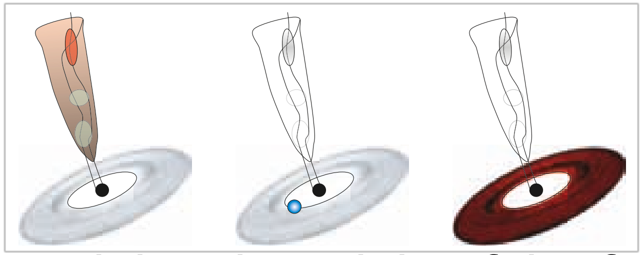
The young stars paradox

Passage of S2 to pericenter

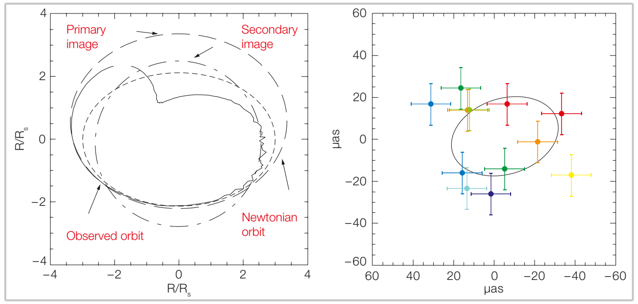
GRAVITY: PI. F. Eisenhauer (MP







Explaining the origin of the flare



GRAVITY at the VLTI: a challenge for the infrastructure

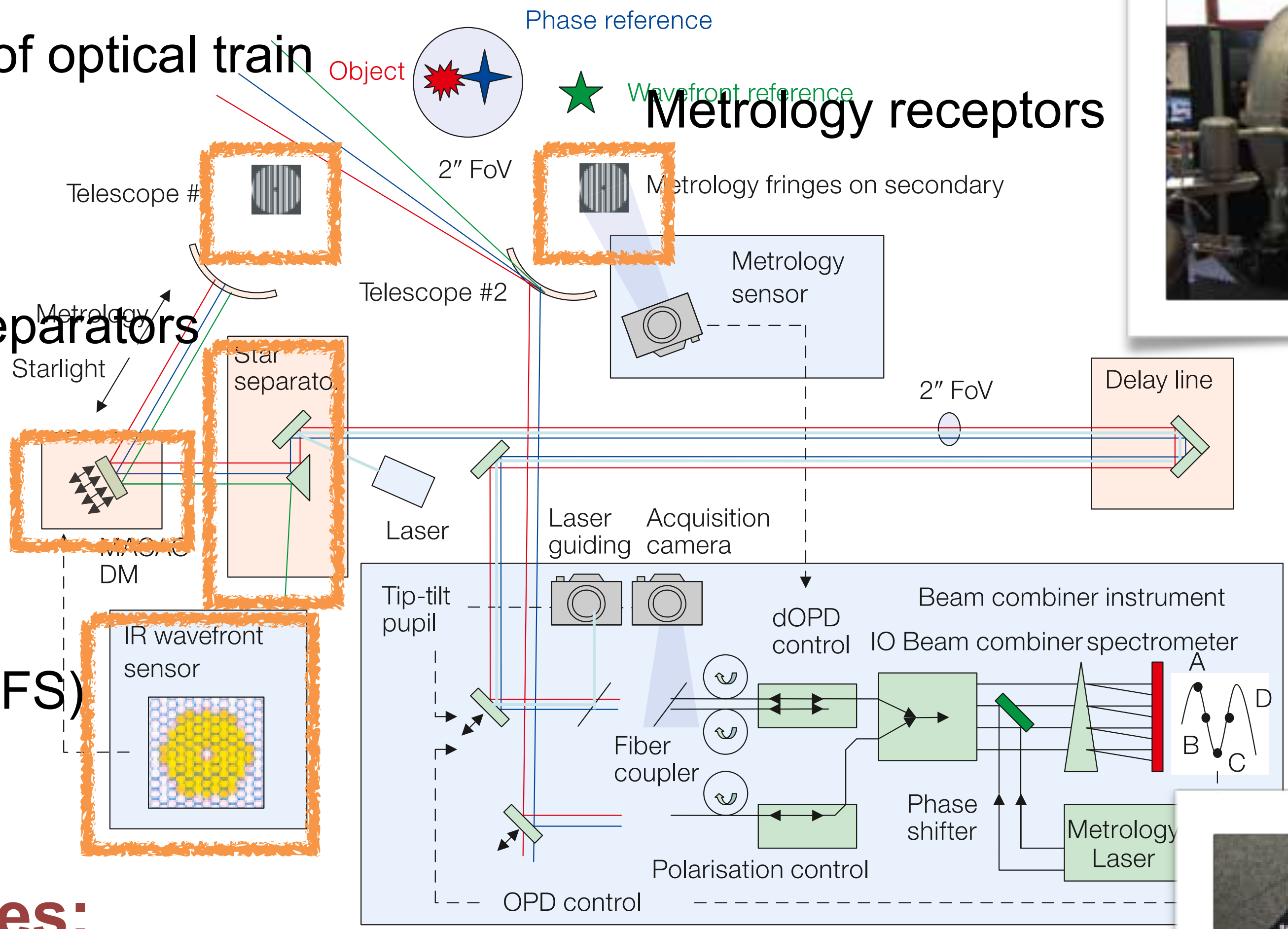
AT: recoating of optical train

Metrology receptors

STAR Separators

UT: CIAO (IR WFS)

AT: NAOMI

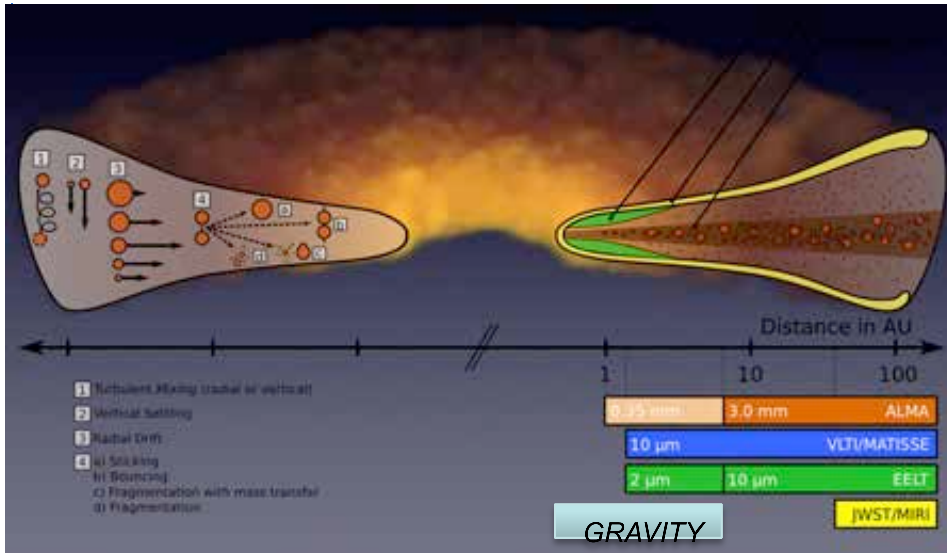


Challenges:

- Astrometry
- Acceptance of “experimental mode”
- Sensitivity

MATISSE

4T,
L, M, N: (R 30 - 4000)
In operation: 2017

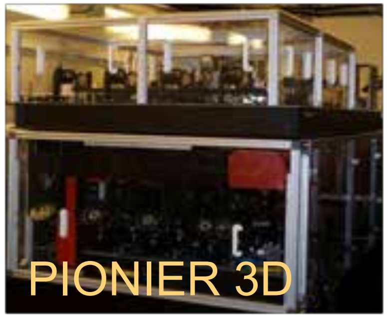


Challenges:

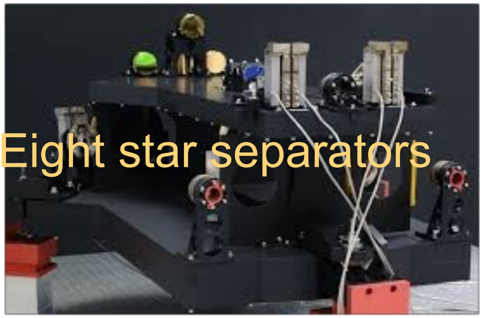
- L band uncharted
- Concept
- Pupil control
- Fringe tracking
- Imaging (uv coverage)

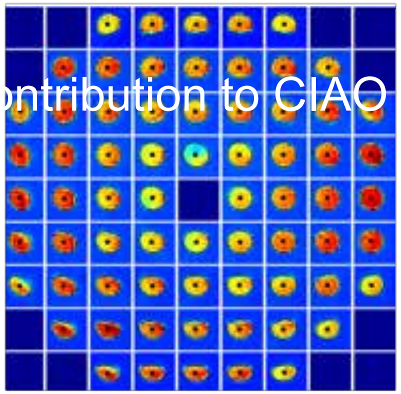
- Star and Planet formation ("Alma counterpart)
  - Dust processing and evolution (mineralogy)
  - Gas kinematics/Ice lines
  - Planet signposts detection
    - Gaps
    - Spirals
  - Young forming planets
- AGN:
  - Challenging the unification scenario

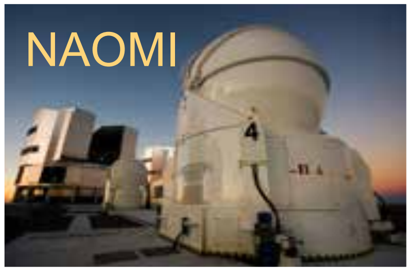
Upgrade the infrastructure:
The VLTI Facility Project (new structuration)



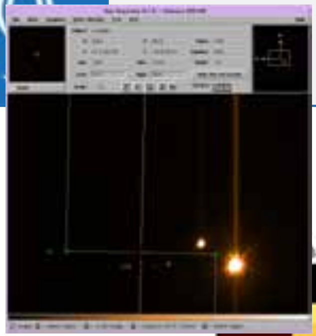
GRA4MAT (FT for MATISSE)

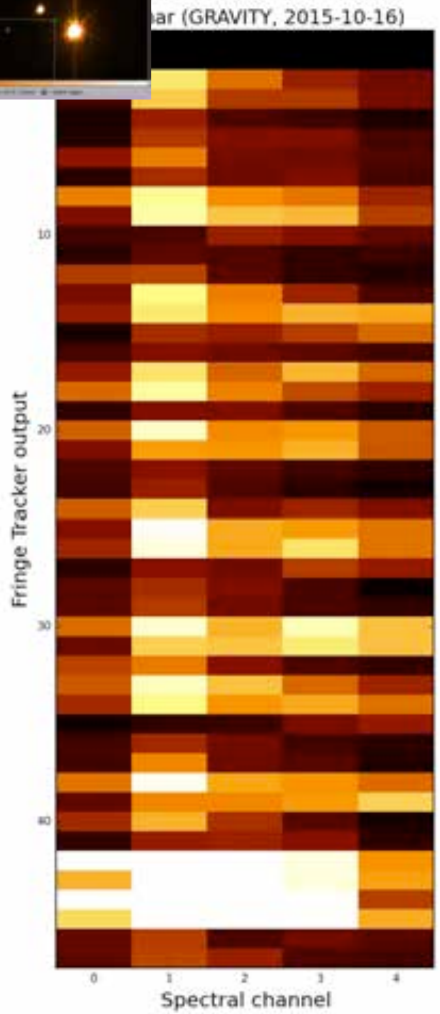


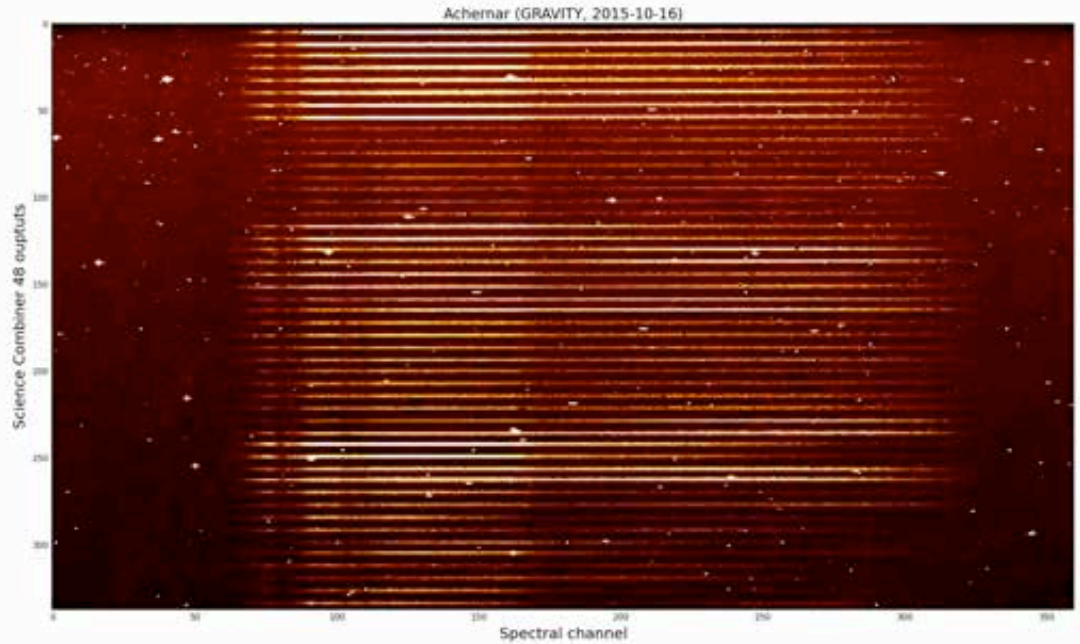




News from Gravity





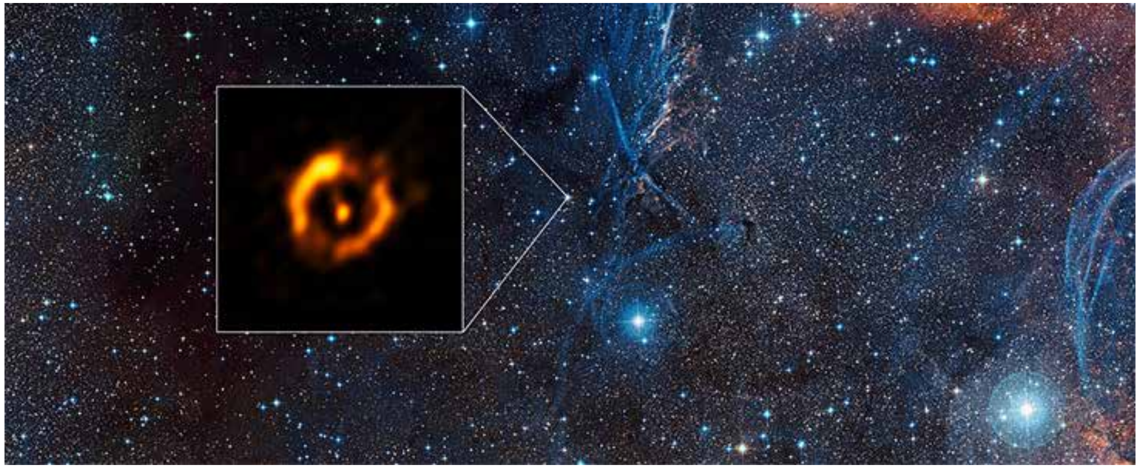


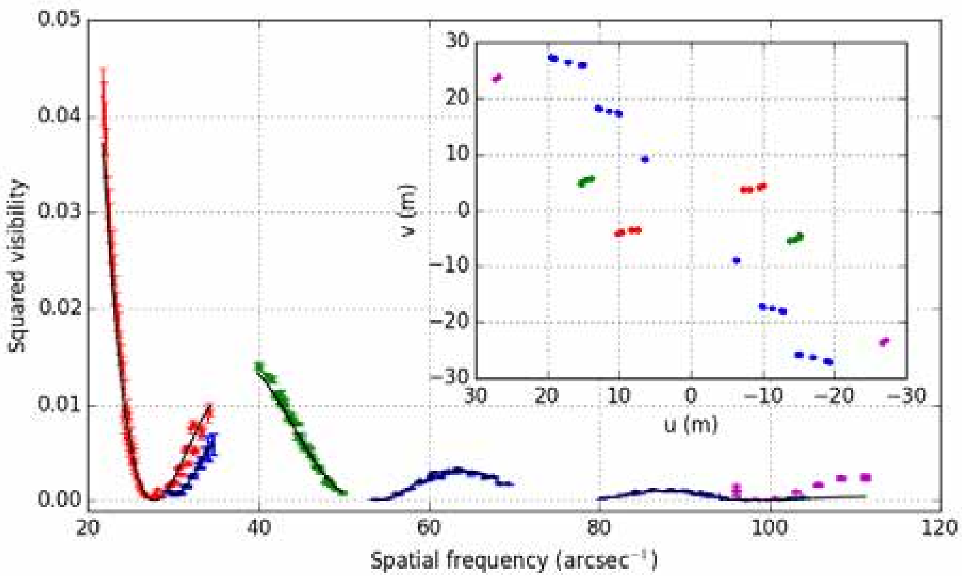
- Imaging on-axis is operational on ATs
  - FT-enabled cience integration ~ 10 minutes
  - CfP 98 + **Science verification**
- Imaging off axis in good shape (K ~7, delta K ~3)
- Star separators commissioned
- Astrometry currently being tested on ATs
- CIAO1 aligned and ready for sky

ON THE OPERATIONS SIDE

The Imaging vs. Monitoring challenge

Hillen et al. 2016

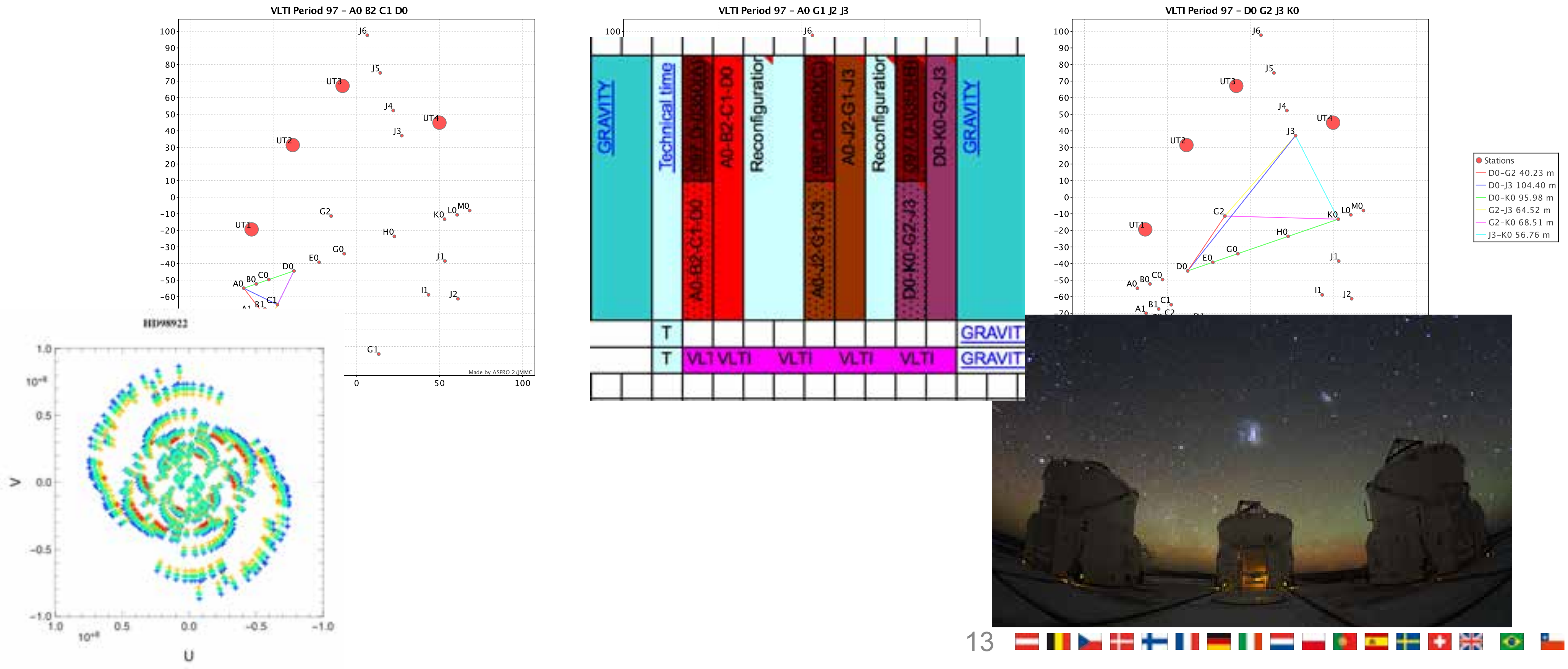




Montarges et al. 2015

A crisis to come:

Scheduling VLTI in the VLT science operations paradigm model is a ~~night-mare~~ challenge



PREPARING THE FUTURE

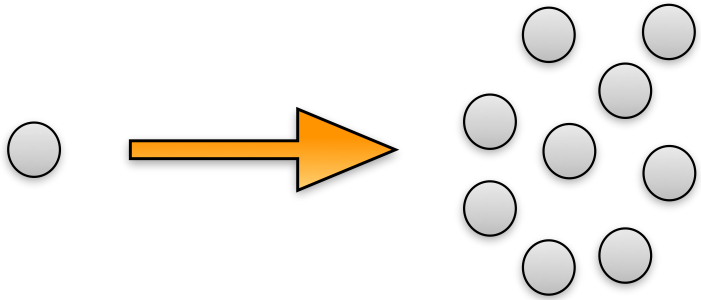
Reasons for Optimism

VLTI is the future of high angular resolution at ESO. ESO Visiting committee 2013

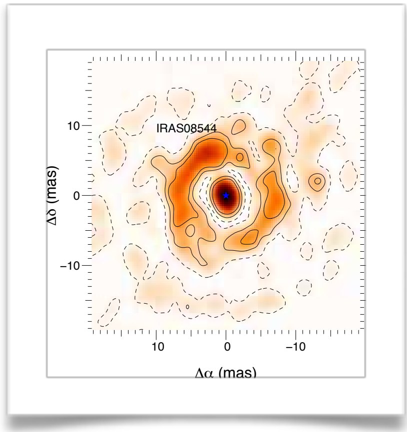
"Perhaps the most important development regarding AGN unification is the significant improvements in long baseline interferometry and the ability to resolve the central structure on a milli-arcsecond scale. [...]" Hagai Netzer, ARAA 2014

Thanks to Hönig et al., we may now have to consider whether some of our resources should soon be put into building a next generation of optical interferometers. *Martin Elvis (CfA) Nature 2014*

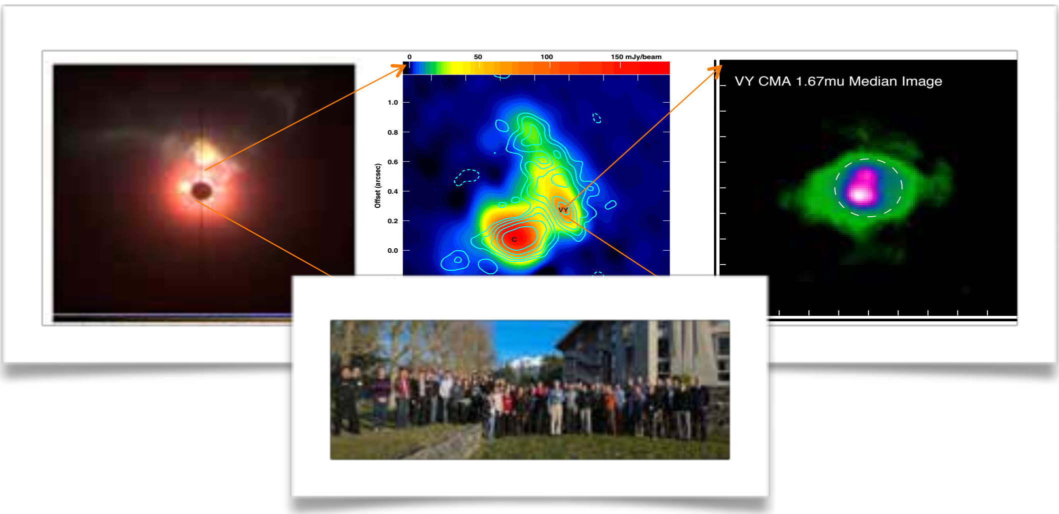
The VLTI should reach its full potential in the next decade: a success is mandatory



Develop surveys and large programs to answer questions with statistical significance



Develop spectro-imaging capability with robust fringe tracking (iShooter: PIONIER-GRAVITY-MATISSE (J band?))



Expand the user base with VLTI expertise centers and develop synergies (European Interferometry Initiative) JMC

There are several possible directions: all of them will require a strong science case

Fundamental stellar physics (PLATO)
Asteroseismology synergy
Kinematics of accretion/ejection
Star-Environment interaction

VISIBLE

Polarimetry

High spectral resolution (> 30000)

A conference in ~ 2020 ??

High dynamic

angular
on ???

Planet formation
Exoplanet & Brown

"Wide" field astrometry

EXO Planet:GAIA and EXAO follow-up

Sensitivity

Strong lensing
SMBH mass measurements

Increased imaging capability (more tel)

All science
Enable time resolved imaging
(Novae, hydrodynamics, convection)

Preparing the future

Visitor vs. Facility ?