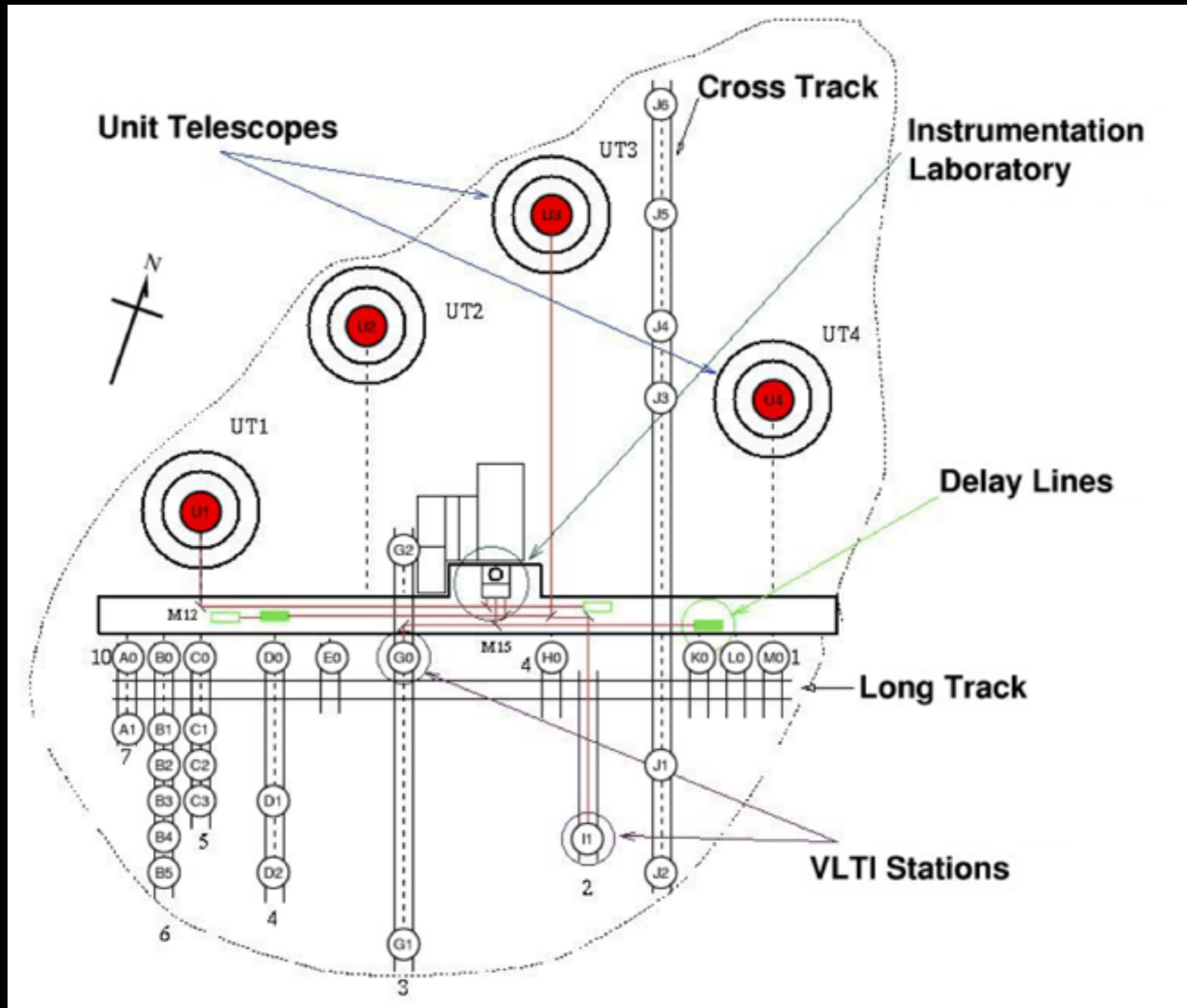




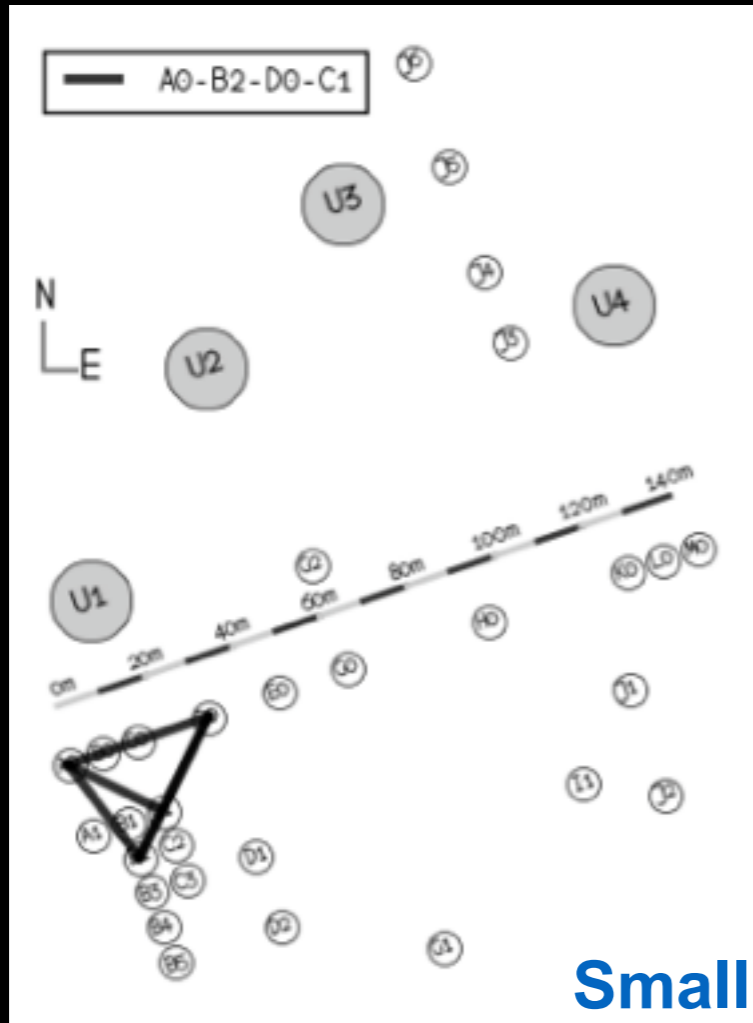
VLT operations

Claudia Cid - Xavier Haubois - Andrés Pino

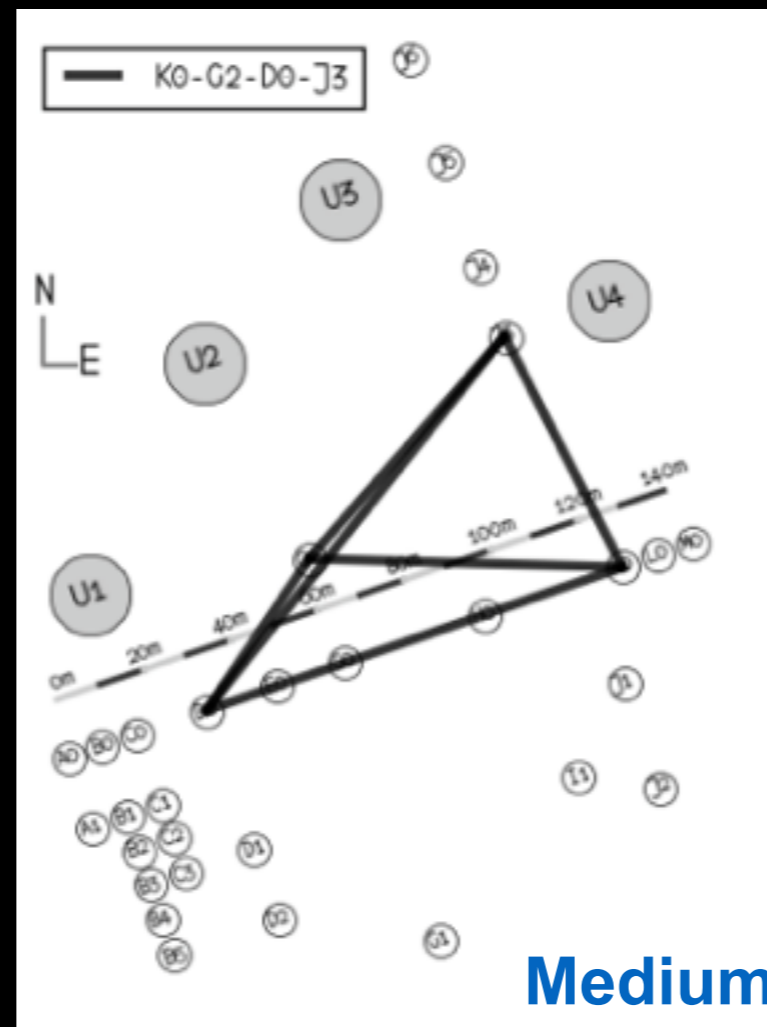
AT Configurations



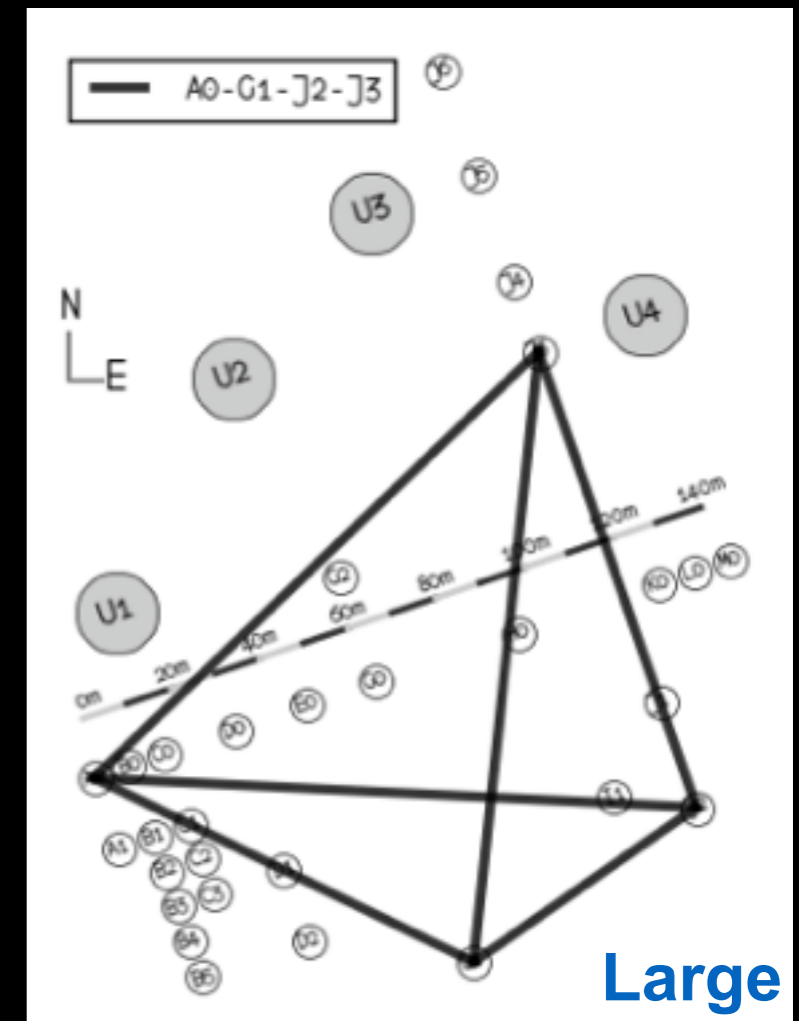
AT Configurations



Short baselines
 $\theta_{\max} \sim 13 \text{ mas}$



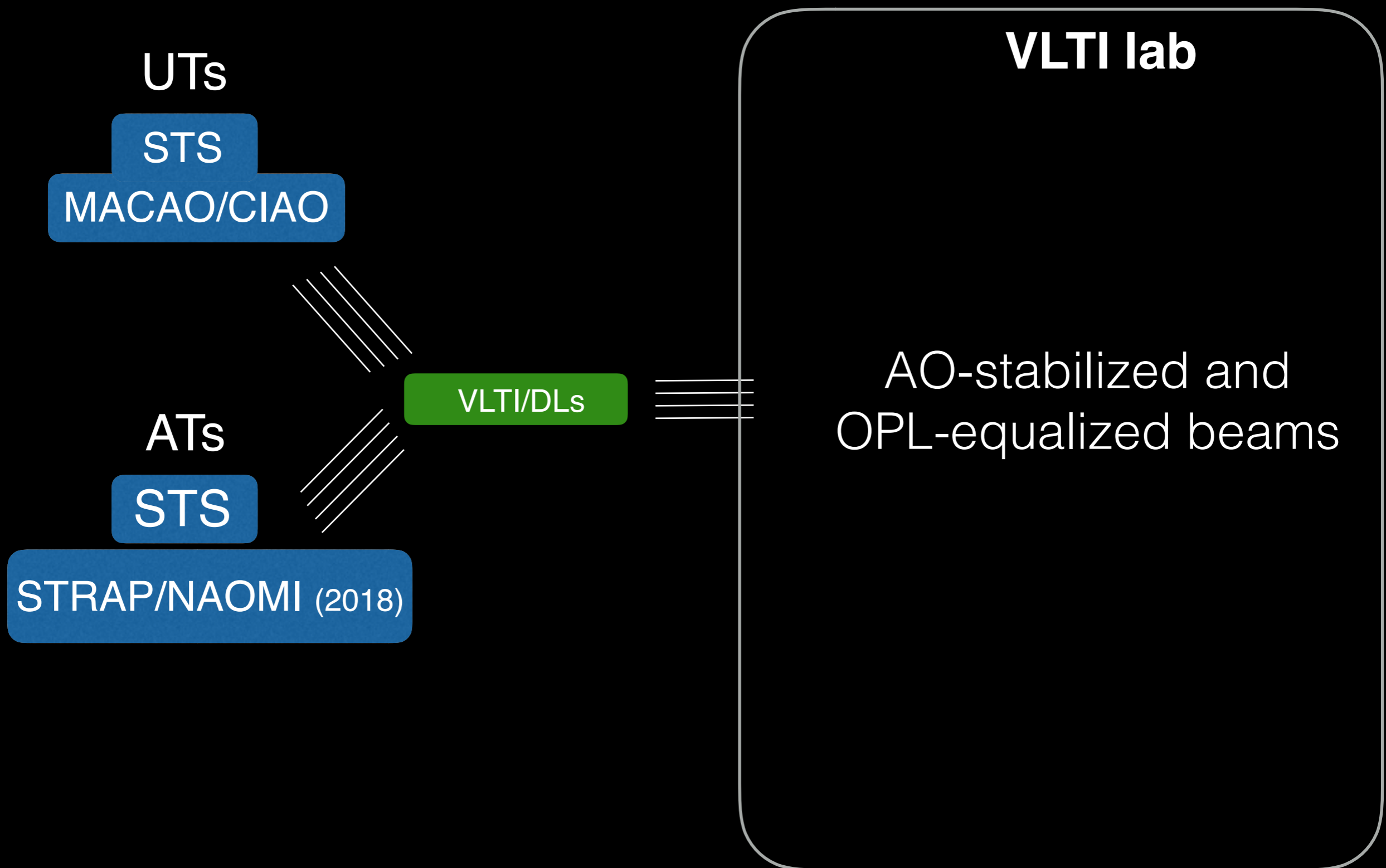
Mix of baseline lengths
 $\theta_{\max} \sim 4 \text{ mas}$



Mostly long baselines
 $\theta_{\max} \sim 3 \text{ mas}$

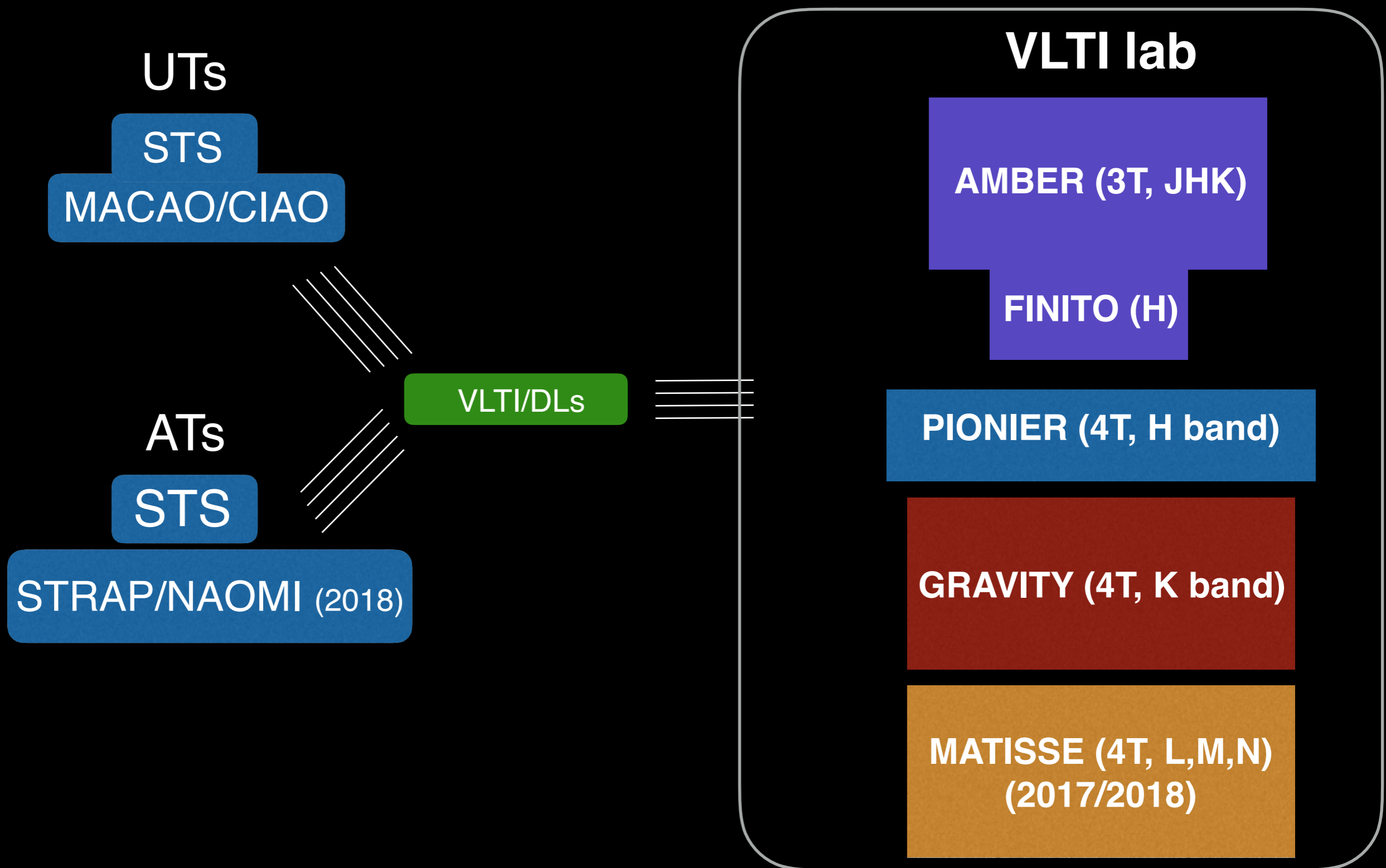


High-level system overview



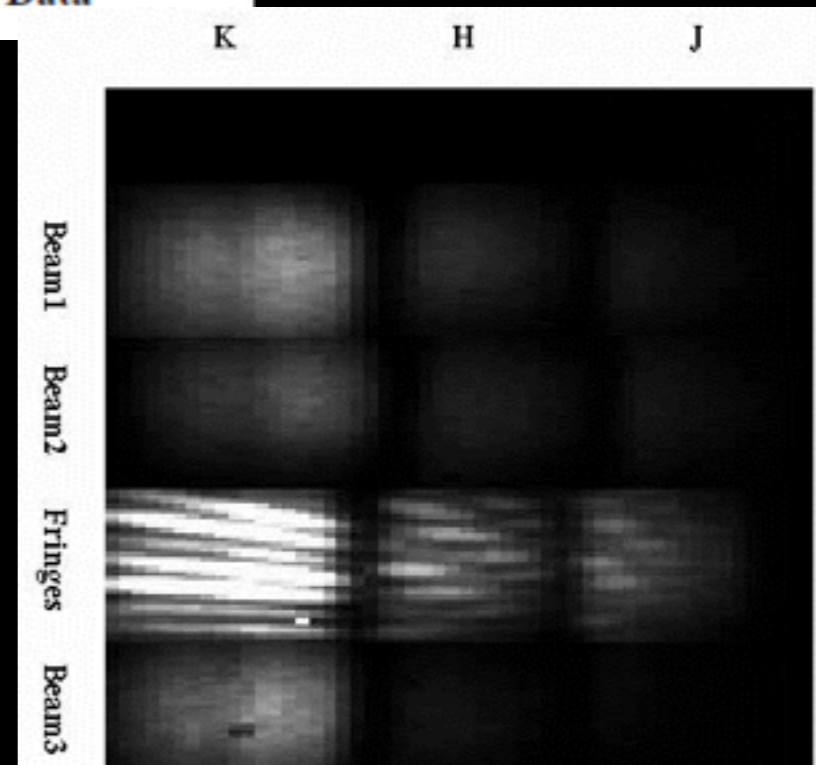
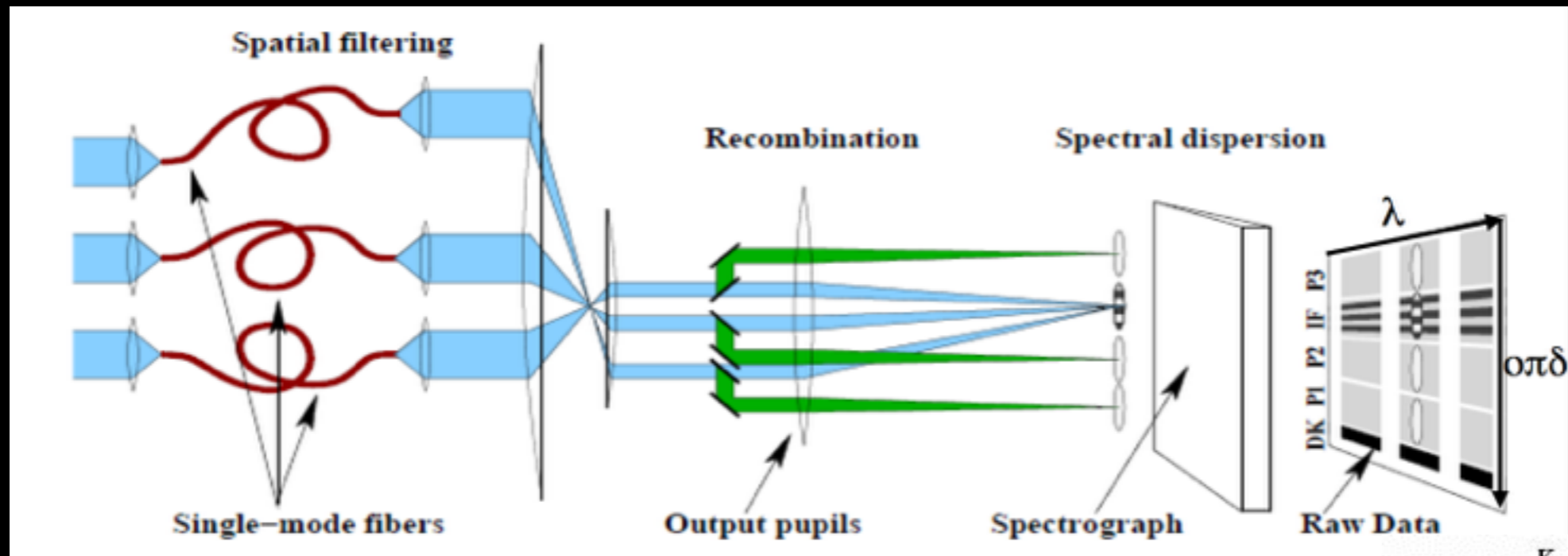


High-level system overview

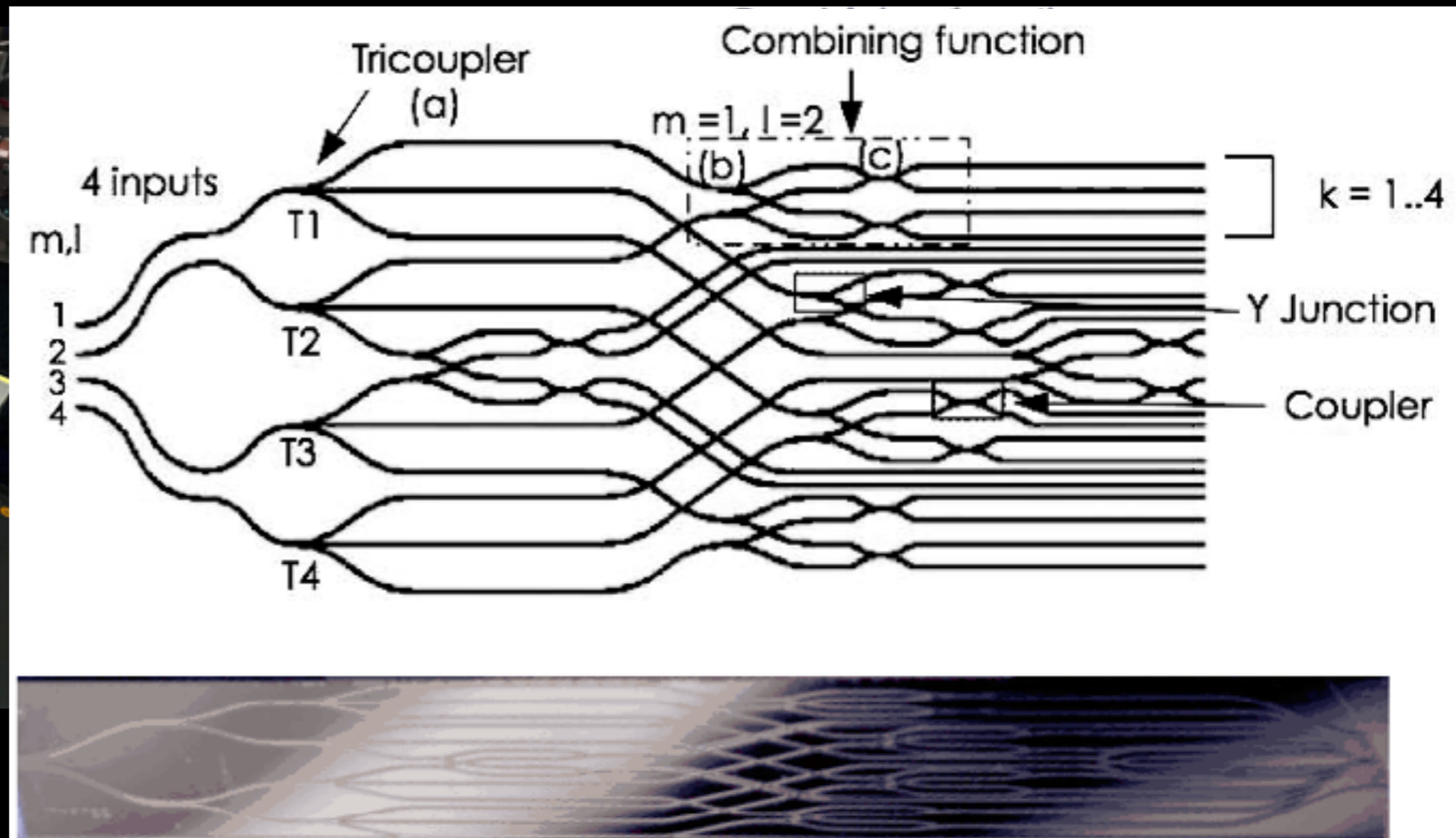
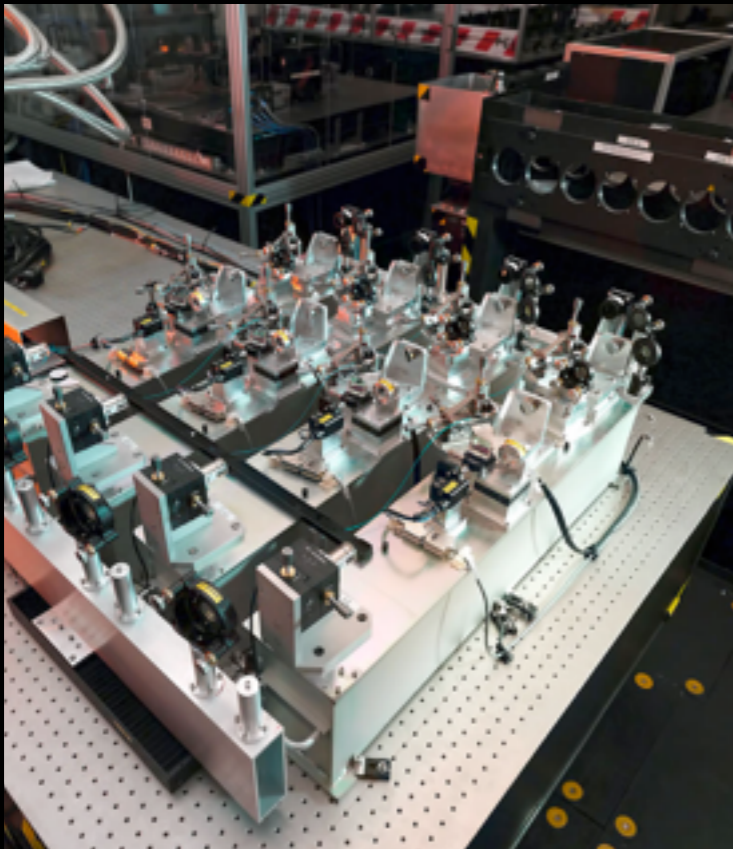


AMBER

- Combines 3 telescopes in J,H,K bands
- Highest spectral resolution at VLT: $R \sim 12000$
- Association with the FINITO fringe tracker (H-band) or self-coherencing



- Combines 4 telescopes in H-band, low spectral resolution
- Integrated optics beam combiner, ABCD sampling of fringes
- RAPID detector, $\min(\text{DIT})=0.5$ ms
- very efficient instrument for imaging, 1 OB \sim 7 min





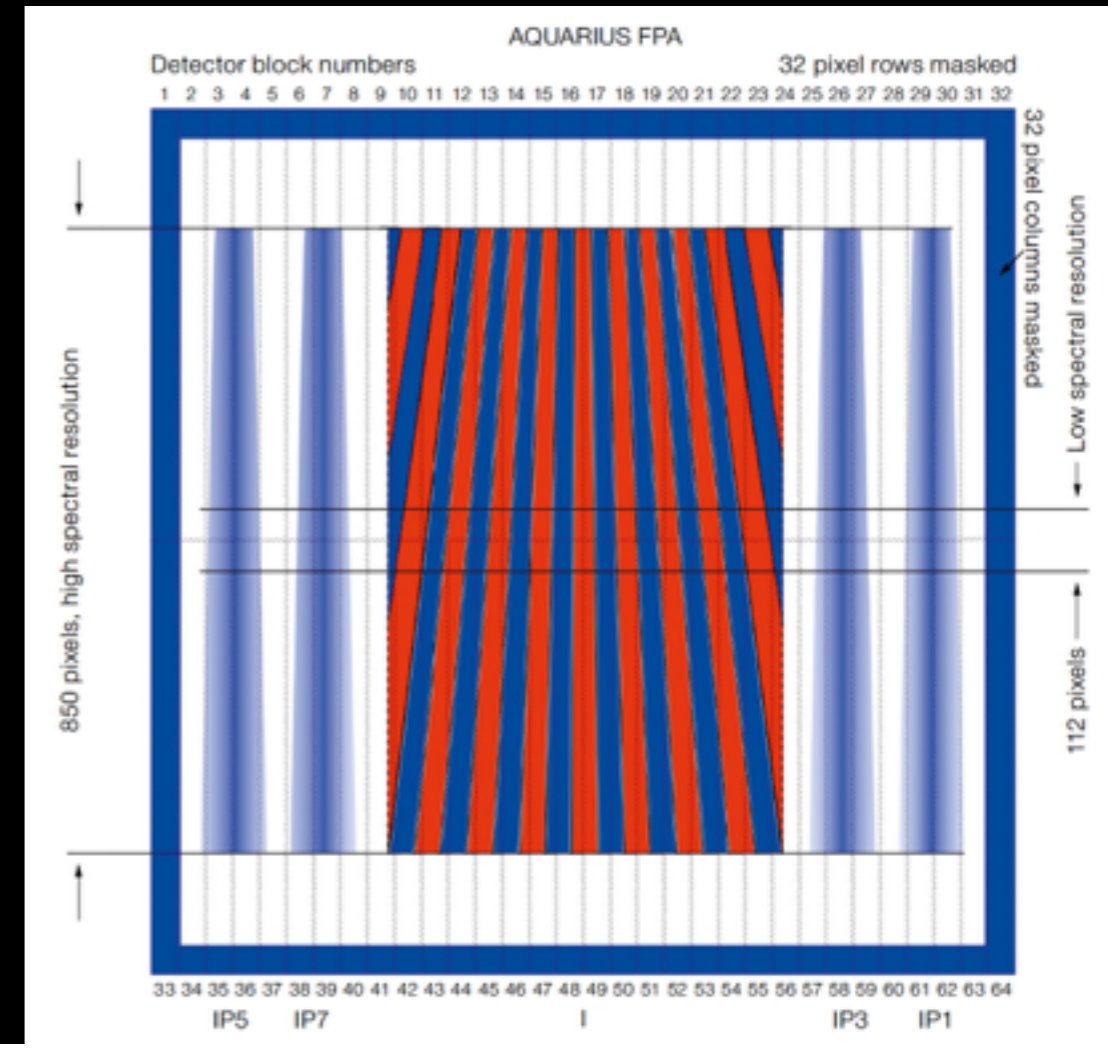
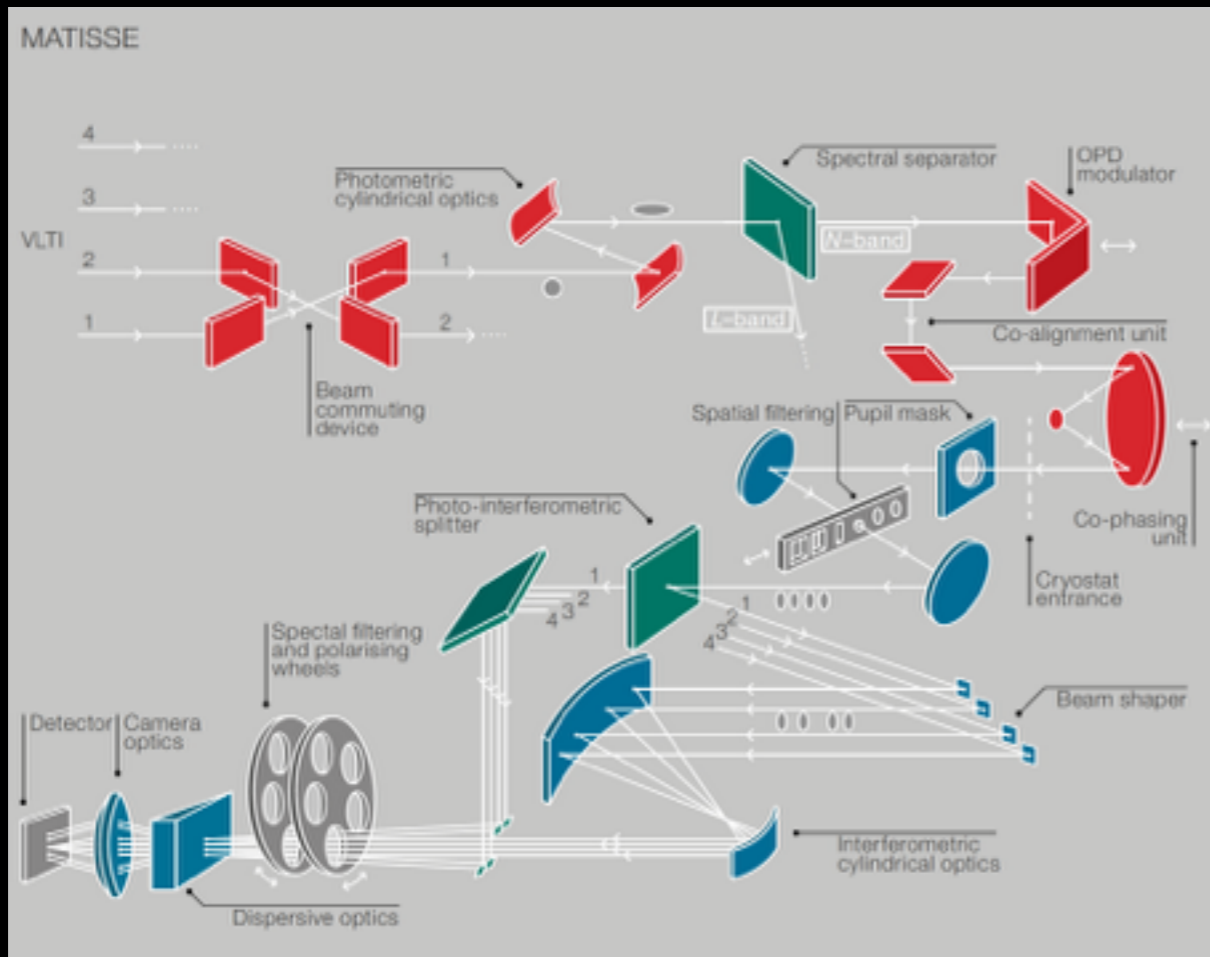
GRAVITY

- 4 telescope beam-combiner
- Internal fringe tracker:
~ minute-timescale « phased » integration
- High angular resolution down to ~3 mas
- Two modes: single or dual field
- Three spectral settings in K-band:
R~20, R~500 and R~4000
- Offered in spectro-imaging
- Astrometry capacities with ~ 50 micro-arcsecond accuracy in dvpmt



MATISSE

- First light foreseen late 2017
- Combines 4 telescopes in L (new at VLTI!), M and N bands

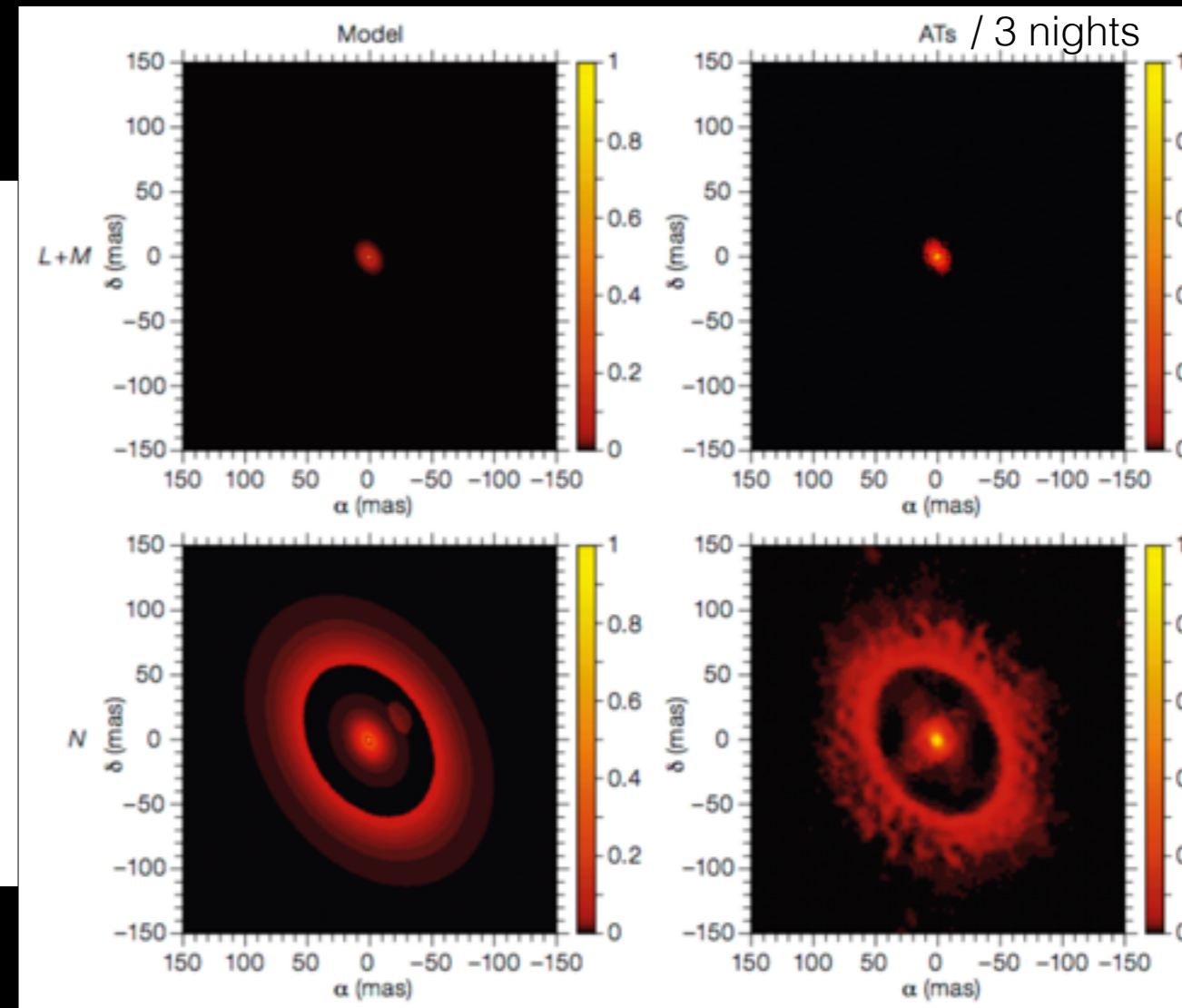


| | <i>L</i> -band sensitivity | <i>N</i> -band sensitivity |
|----|--|---|
| AT | Spec = 6.5 Jy ($L = 4.1$), Goal = 1.25 Jy | Spec = 45 Jy ($N = -0.25$), Goal = 10 Jy |
| UT | Spec = 0.65 Jy ($L = 6.6$), Goal = 0.12 5Jy | Spec = 3 Jy ($N = 2.7$), Goal = 0.75 Jy |

Lopez et al., The ESO Messenger, 157, 2014

- Main objectives: AGNs, Protoplanetary disk but also dynamics and chemistry of winds/discs, evolved stars

| Feature | Wavelength (μm) |
|--|------------------------------|
| <i>L- and M-bands (~ 2.8–5.0 μm)</i> | |
| H ₂ O (ice) | 3.14 |
| H ₂ O (gas) | 2.8–4.0 |
| H lines (Br- α , Pf- β) | 4.05, 4.65 |
| PAHs | 3.3, 3.4 |
| Nano-diamonds | 3.52 |
| CO fundamental transitions | 4.6–4.78 |
| CO (ice) | 4.6–4.7 |
| <i>N-band (~ 8.0–13.0 μm)</i> | |
| Amorphous silicates | 9.8 |
| Crystalline silicates (olivines and pyroxenes) | 9.7, 10.6, 11.3, 11.6 |
| PAHs | 8.6, 11.4, 12.2, 12.8 |
| Fine structure lines (e.g., [S IV], [Ne III], [Ne II]) | 10.5, 10.9, 12.8 |



Lopez et al., The ESO Messenger, 157, 2014
 Matter et al., 2016, [arXiv:1608.02351](https://arxiv.org/abs/1608.02351)



Instrument overview

| | AMBER | PIONIER | GRAVITY | MATISSE |
|---------------------------------------|--------------------------|-----------------|-------------------------------------|----------------------|
| # of combined telescopes (ATs or UTs) | 3 | 4 | 4 | 4 |
| Spectral range and resolution | H-K (35, 1500, 12000) | H (none, 30) | K (22, 500, 4000) | L, M, N (30-5000) |
| Fringe tracker | FINITO | | Dedicated internal FT (on/off-axis) | GRA4MAT |

+ astrometry offered in the near-future



Instrument spatial resolution and spectral coverage

