

MIRCX - MYSTIC synergies with SPICA

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Gardner (UM), Aaron Labdon (Exeter), Denis Mourard (Nice),
Philippe Berio (Nice), Sylvain Rousseau (Nice), CHARA team...



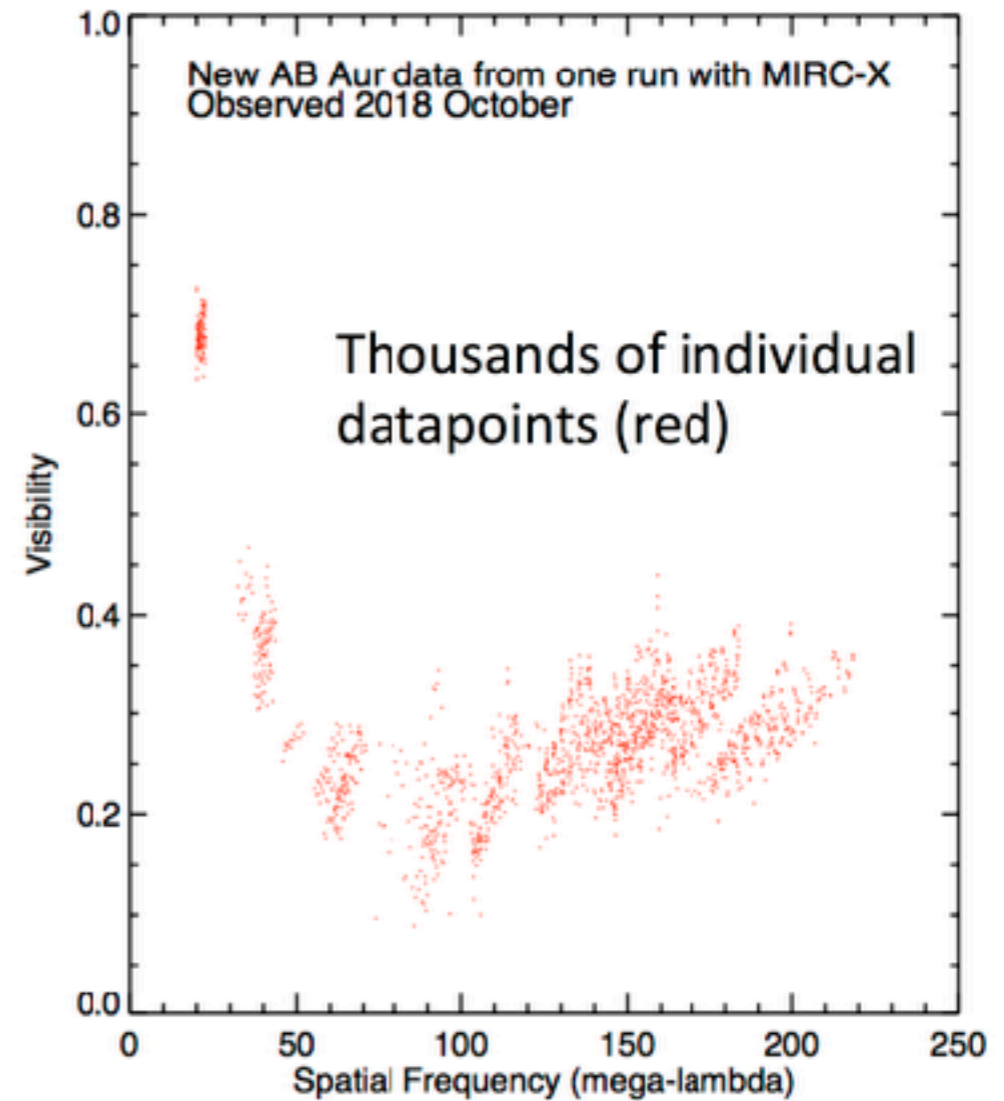
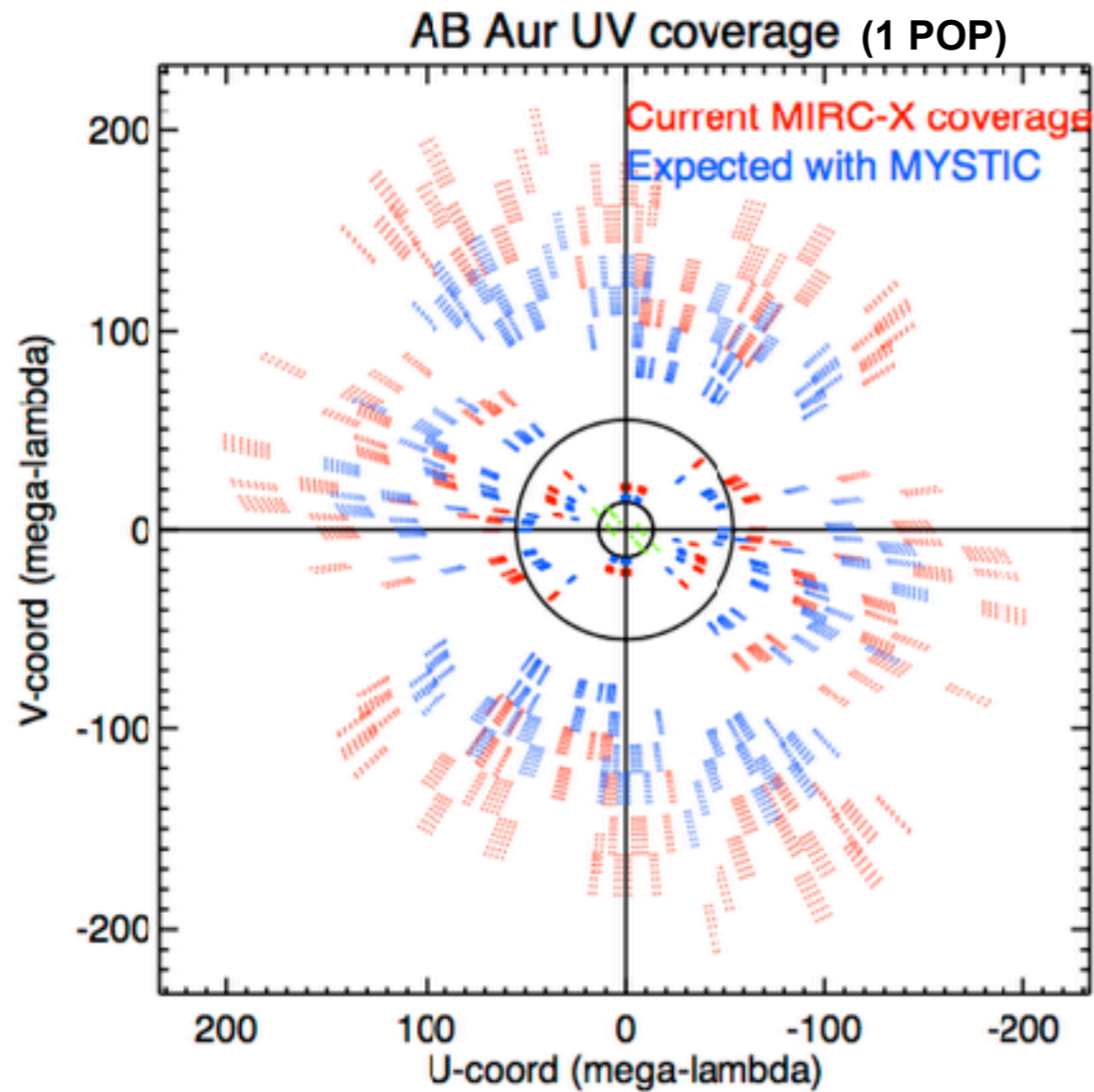
In a nutshell

- Build on the success of the MIRC 6-beam combiner
- **MIRCX** (H-band): Upgrade sensitivity of MIRC with new camera and design, lead by S. Kraus (Exeter). Open J-band and polarisation.
- **MYSTIC** (K-band): Develop a cryogenic copy, that can be operated simultaneously. Lead by J. Monnier (Michigan).
- Implement **fringe-tracking** MIRCX <-> MYSTIC and MIRCX+MYSTIC -> SPICA. Collaboration lead by D. Mourard (Nice).

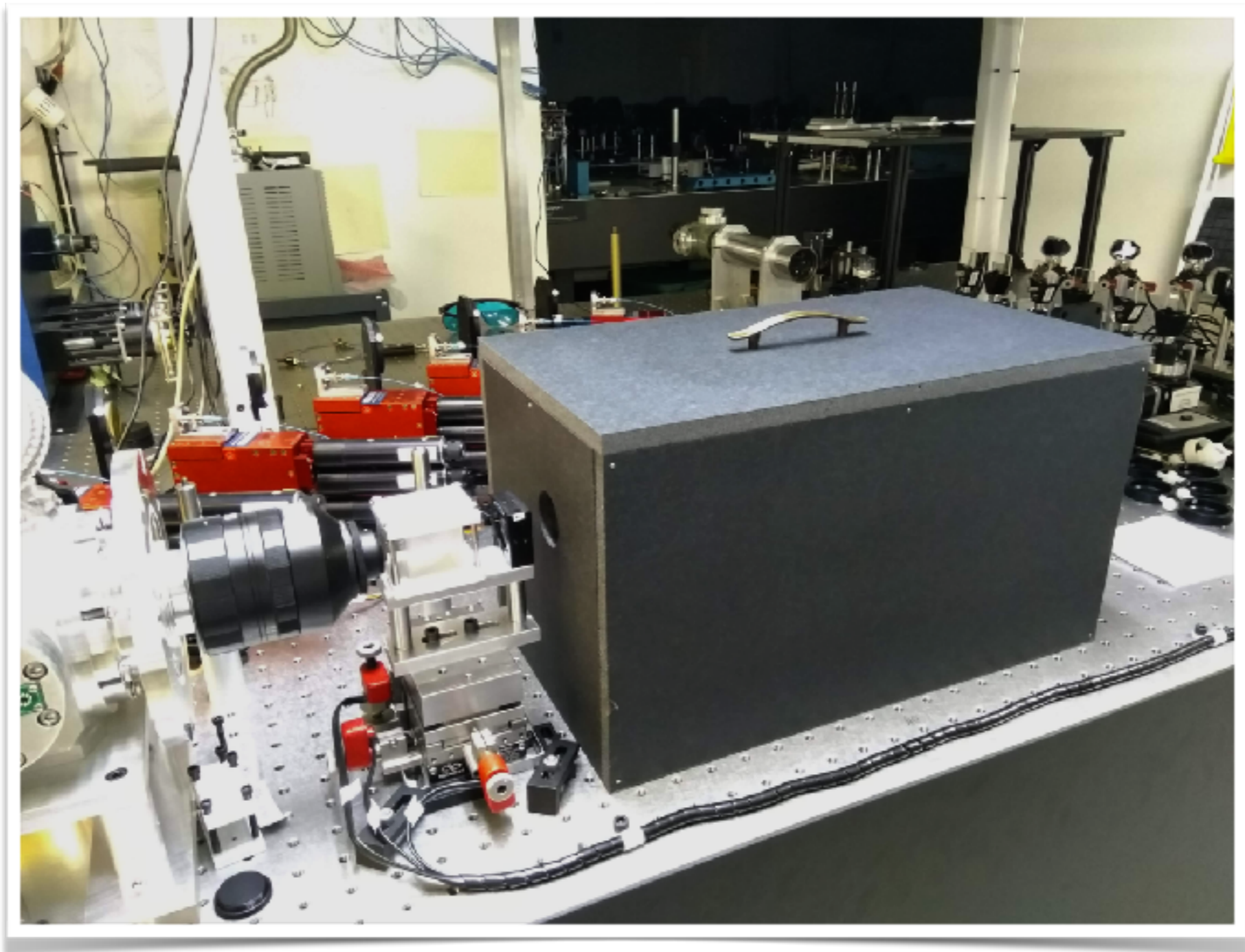
Core sciences

- Sensitive imaging for the inner AU of ~20 Young Stellar Objects
- Accuracy for exoplanets detection (direct and astrometry)
- Polarisation and spectro-interferometry
- Efficient binary machine to survey and follow-up >100 Massive Stars.

30 baselines at once



MIRCX at CHARA



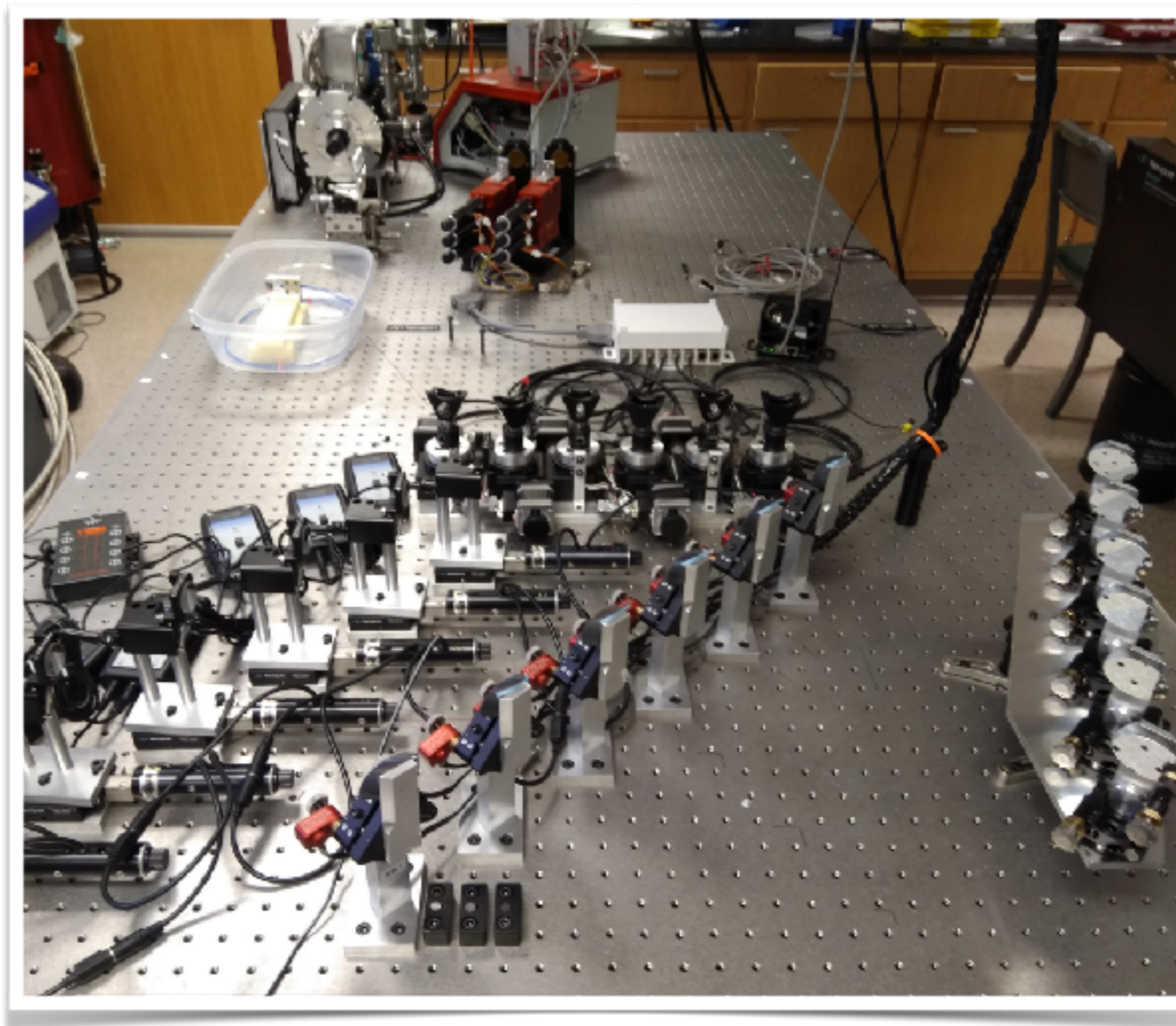
In operation at CHARA since September 2018

MIRCX at CHARA



MIRCX table has room for MYSTIC (30 baselines in one table !)

MYSTIC in Michigan



Expected to be moved to CHARA in summer 2019

Synergies with SPICA

- Need for Adaptive Optics: collaborate with CHARA !
- Shared 6-beam coherent calibration source in CHARA lab. Currently being tested in Michigan. Ideally improved with contributions from Nice.
- Simultaneous observations: regular and fruitful discussions on software and hardware choices.

A possible goal: $V + J + H + K \times 15$ baselines at once, with 3 instruments operated in an efficient/coordinated way.

Fringe-Tracking

MIRCX -> SPICA

- MIRCX/MYSTIC are designed to fringe-track for each other (fast low noise camera, fast acquisition).
- SPICA and MIRCX/MYSTIC teams collaborate on a software architecture for fringe-tracking for SPICA, with the SPICA team interested in advance control.
- SPICA team is developing an alternate beam combiner in MIRCX, optimised for fringe-tracking (IO-chip).
- Probably around end 2019, beginning 2020, thus well on time for SPICA itself.

Challenges

- Develop a dual-injection module for MIRCX to use either the new IO-chip or the current combiner.
- LADC is mandatory for V+J+H+K. But glass of the LADC of CHARA is not ideal for K-band.
- MIRCX/MYSTIC is a small-team project. We need to be very pragmatic !!
- Operating 3 instruments simultaneously at CHARA will surely pose some operational challenges !