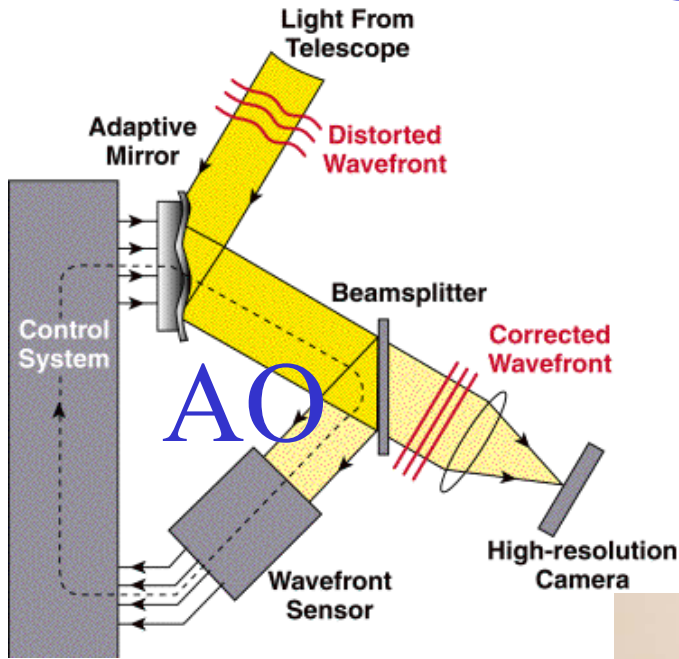




A Quick Update On:



The MSIP Proposal

Theo ten Brummelaar - Director of the CHARA Array





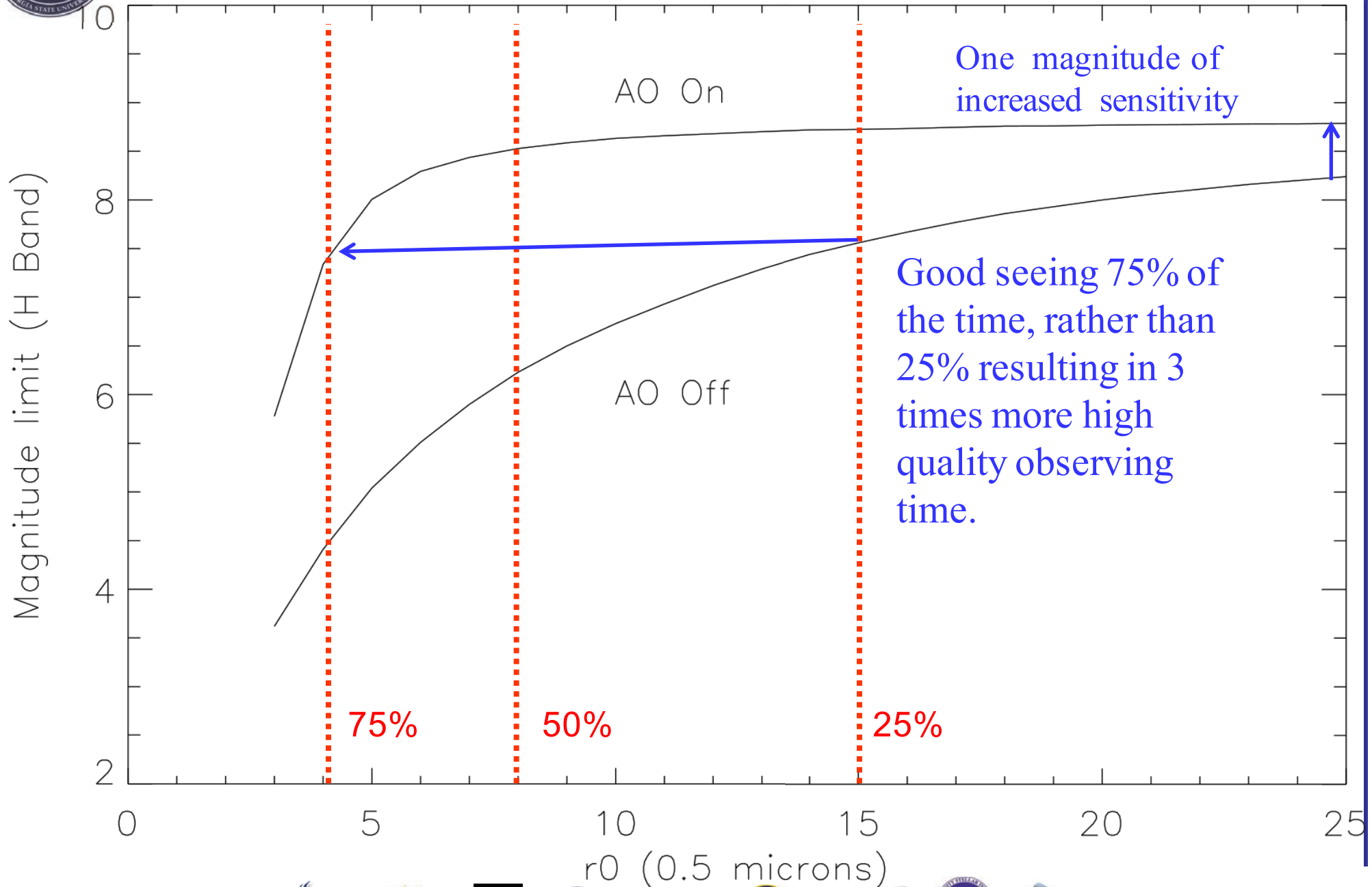
The CHARA Array Adaptive Optics Program

- The CHARA Adaptive Optics Program is broken into 2 Phases.
- This is purely an artifact of funding realities.
- **Phase I (NSF/ATI \$1.1M)**, which includes Wavefront Sensors for each telescope and non-common-path AO systems for the laboratory, was funded in 2010 and is now nearing completion.
- **Phase II (NSF/MRI \$1.6M)**, which includes deformable mirrors for each telescope, began earlier this year.

The program is fully funded.

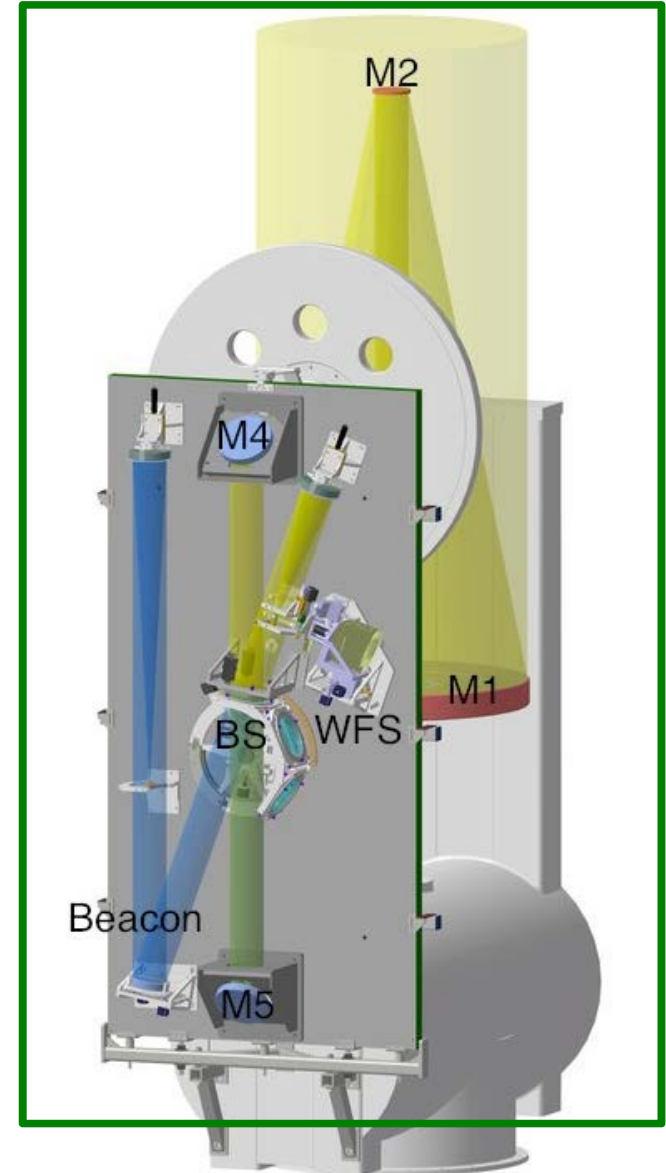


The Phase II Money Plot...



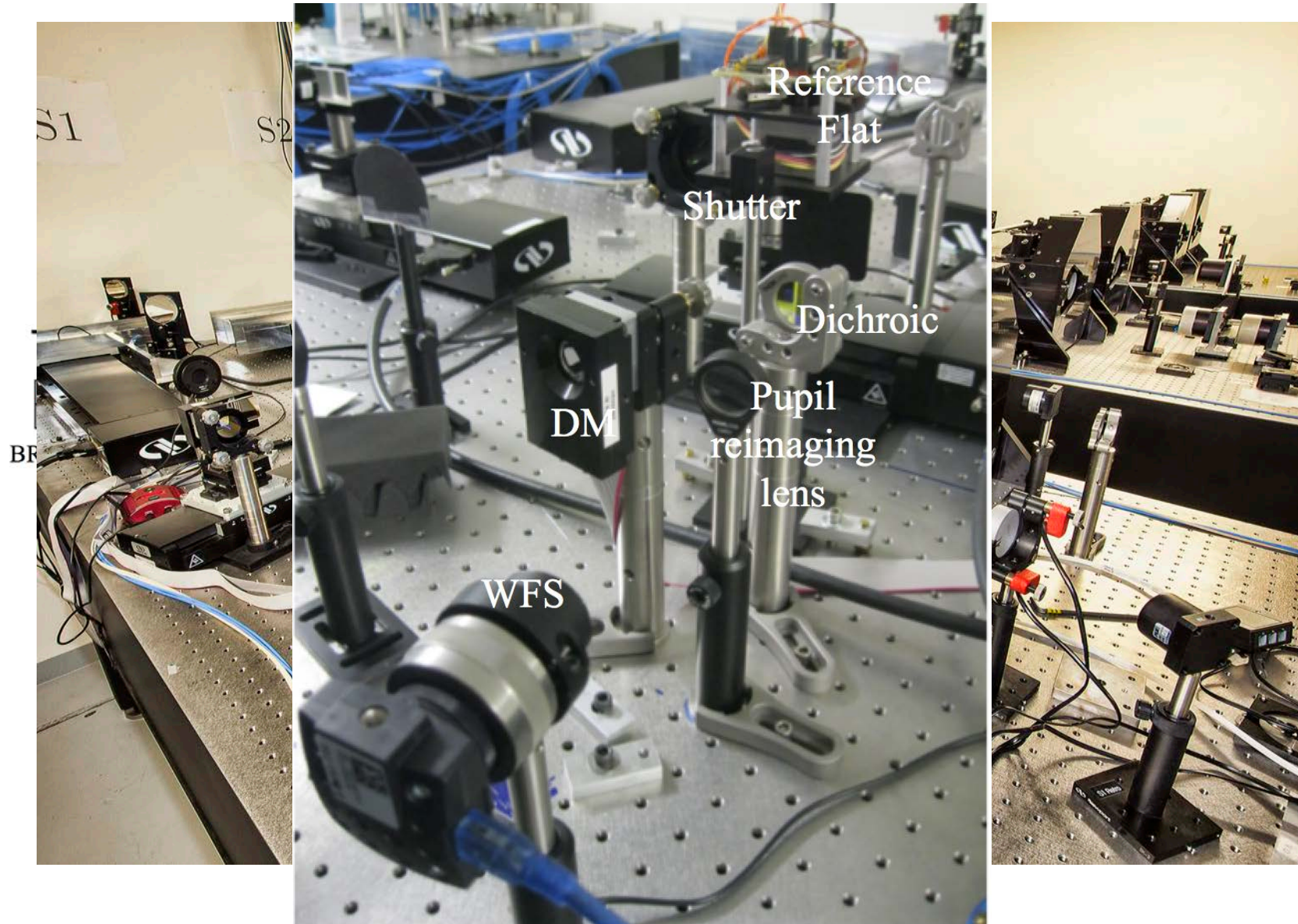


CHARA-AO Phase I: Telescopes



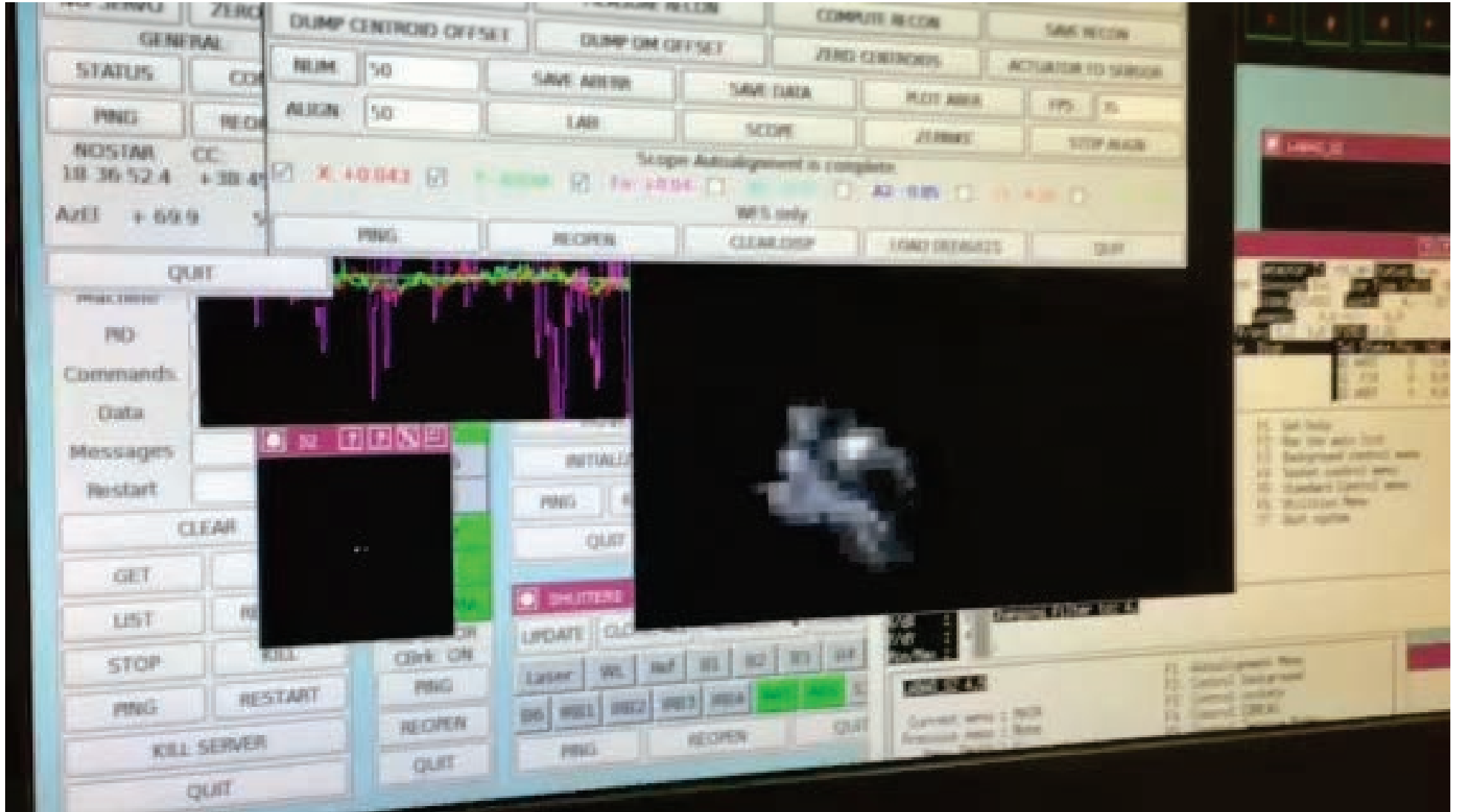


CHARA-AO Phase II: LABAO



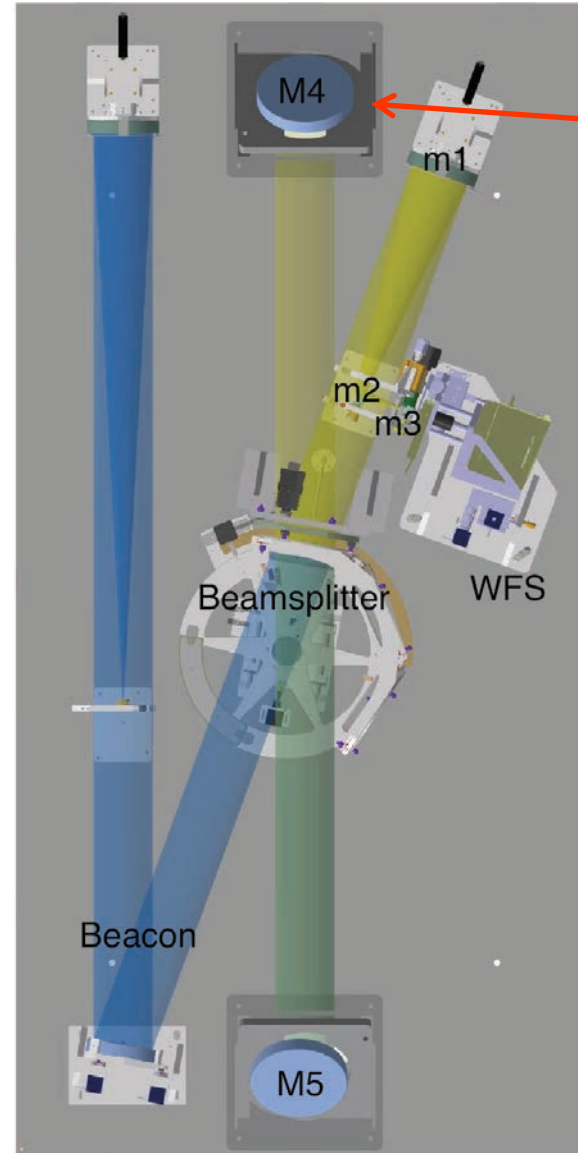


CHARA-AO Phase I First On Sky Test





CHARA-AO Phase II: Telescopes



Phase II funds replacing M4 with a deformable mirror at each telescope which will enable us to correct for atmospheric seeing and increase scientific throughput.



Phase I : Current Status

- Phase I funding ends this June. We expect all hardware to be in place this calendar year.
- We still have much to learn about alignment and use of this system (Talks later today).
- Scheduled Observing has been postponed till mid-May in order to allow complete on-sky testing of the S1/S2 baseline with the full Phase-I Adaptive Optics installed.



Phase II : Current Status

- Phase II funding began September 2015, and lasts for 3(4) years.
- The Purchasing Department has deemed the DMs to be “Scientific Instrumentations”.
- An RFP with a deadline just before this meeting was sent out in January 2016.
- Negotiations will begin with vendor(s) this April.
- Delivery of first mirror is expected in the first or second quarter of 2017.



Phase II : Possible Vendors

- **ALPAO** – 2 options of a modified version of existing 69 actuator mirror. One full size, one smaller.
- **Cilas** – 5 options, all modified versions of existing 64 actuator monomorph mirrors, three full size, two smaller. “Any electrode design possible”.
- **Northrop Grumman (AOX)** – Modified version of an existing 58 actuator PZT based mirror.



Phase II : Possible Vendors

- **Boston Micromachines** – Modified versions of existing 32 or 111 actuator mirrors. Small size.
- **Microgate/ADS** – Custom mirror based on same voice coil technology as VLTI and LBT.
- **MZA Associates Corporation** – Custom Mirror, PZT actuator based technology.
- **TNO** – Custom mirror 60 actuator mirror. Similar technology to Microgate/ADS. Joint development program.



Phase II : Bottom Line

- Quotes from 6 “viable” vendors are remarkably similar with a mean price of:

\$136±13.6k per mirror

- Original Budget, based on previous quotes was \$825k, so we have:

\$118k per mirror for 7

\$137.5k per mirror for 6

To quote Steve Ridgway “This project may actually work!”



Current Funding – Is “Stable”

- **College of Arts and Sciences**
 - Funds us on a yearly Basis, renegotiated each year.
 - Funds several full time positions, MWI fees, utilities, travel, and some maintenance.
- **National Science Foundation**
 - The “Standard CHARA grant” of 5 years funds the remainder of the staff. This runs out in 2017 and will need to be renewed this year.
 - Funds our Adaptive Optics Program and the MYSTIC program at the University of Michigan.
- **European Research Council – MIRCx program**



Future Funding Opportunities

- **National Science Foundation** – The “Mid-Scale Initiative Program”.
- **New beam combiner possibilities** – a new Visible Light Beam Combiner for CHARA, an initiative of the group here in Nice.
- **More sensitive acquisition cameras** – a proposal by Makoto Kishimoto at Kyoto Sango University.
- **Possible direct observational support** from collaborative institutions.

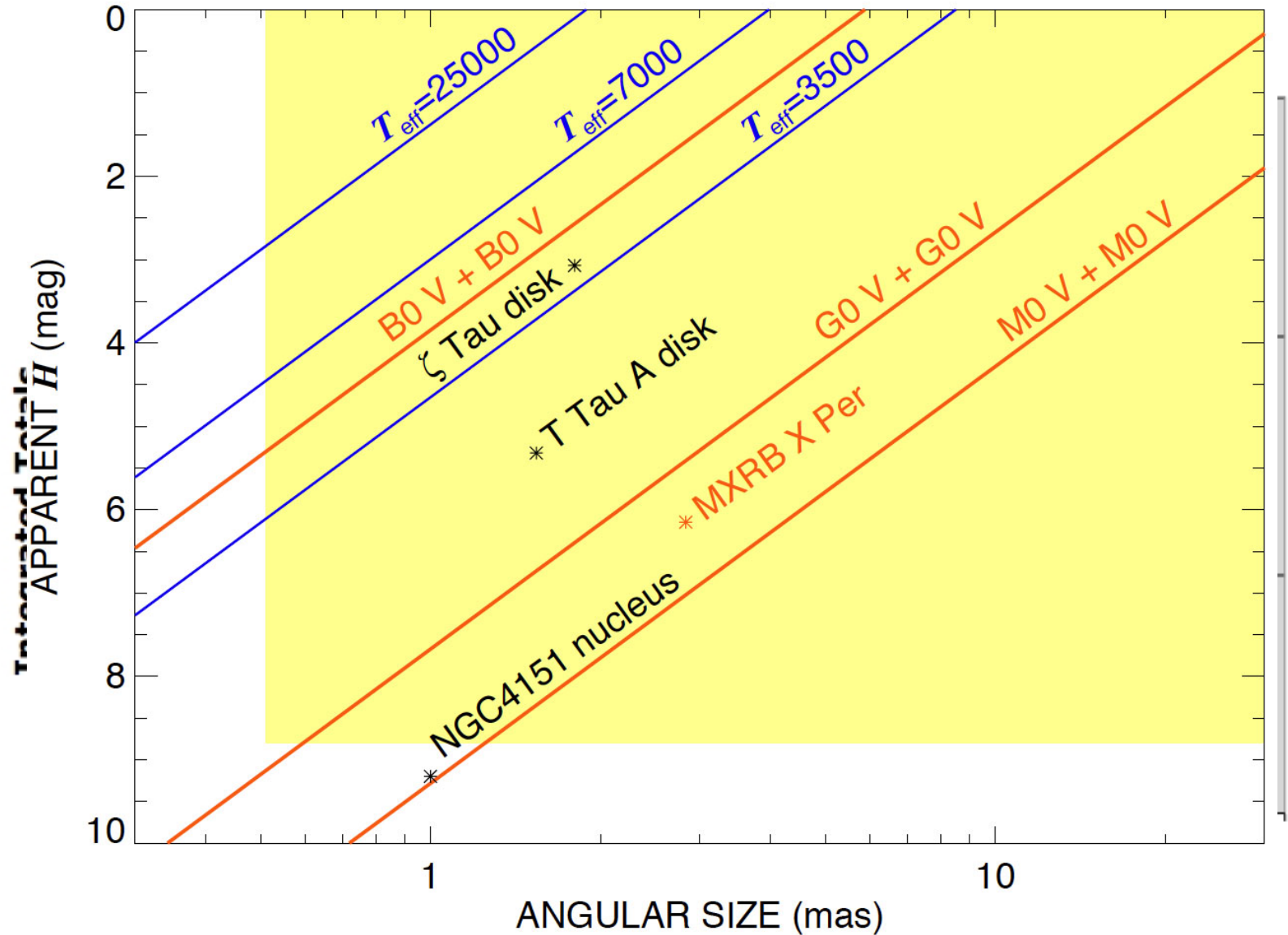


Enabling Milliarcsecond Astrophysics: Open access for the CHARA Array

- The NSF/MSIP program is a response to the previous decadal report that stated that the NSF needs to direct more funding to mid-scale (\$4-\$40M) programs, including new instruments, access to existing instruments, and access to existing data archives.
- Our proposal is for \$4M over 5 years to fund 50-75 nights per year of open access to the CHARA Array through the NOAO TAC process.

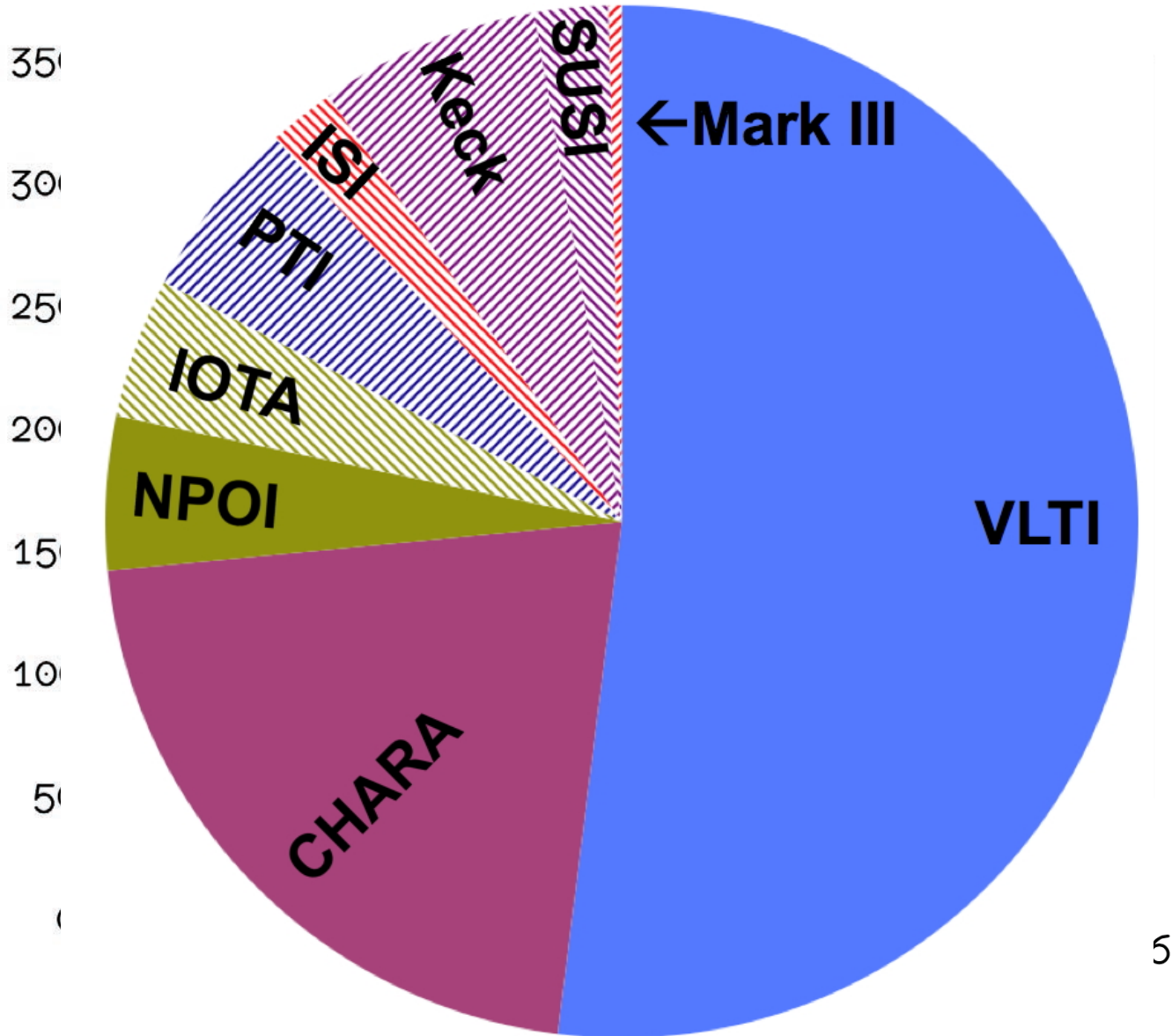


Proposal focus A – “Optical Interferometry is not as obscure or as difficult as many believe.”





Proposal focus B– “The U.S. lags Europe in access to, support of, and education about OIR Interferometry”





MSIP would provide:

- Five new positions on the mountain as described by Doug Gies.
- \$0.5M funding for equipment upgrades and spare parts.
- Travel support for VSS, DS, and PI's awarded time at the Array.

We should know in June or July, and if we're lucky the money will begin to flow in September.