Applying for Time at the CHARA Array

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www.chara.gsu.edu/observers/applying-for-chara-time

Outline

- NSF Midscale Innovation Program
- Resources to help you get started
- NOAO proposal process and 2018B CFP
- CHARA staff support
- VLTI proposals

Community Access to CHARA

- Initiating an open access program at CHARA that is supported by a NSF/MSIP award
- Community access to telescope time and a user-friendly database of archival data
- Time allocated through NOAO TAC:
  25 nights in 2018B (Aug – Dec; due **Mar 30**)
- Providing 25 nights/semester over next 4 years
- About 2x oversubscribed in 2018A (Feb – July)

Books

- *Practical Optical Interferometry: Imaging at Visible and Infrared Wavelengths*, David Buscher & Malcolm Longair ($32)
- *Principles of Stellar Interferometry*, Andreas Glindmann ($169)
- *Introduction to Optical Stellar Interferometry*, Antoine Labeyrie, S. Lipson, & P.Nisenson ($57)

Free Materials

- Introduction to the theory of interferometry,
  C.A. Haniff
  http://nexsci.caltech.edu/workshop/2006/talks/Haniff_theory.pdf
- Optical Interferometry in Astronomy, John Monnier
  http://dept.astro.lsa.umich.edu/~monnier/Publications/ROP2003_final.pdf
- Principles of Long Baseline Interferometry,
  P. Lawson et al.
  https://ecommons.cornell.edu/handle/1813/41240
- CHARA Publications:
  http://www.chara.gsu.edu/astronomers/publications
  Scientific, technical

http://ast.noao.edu/facilities/other/chara

- CHARA Website

- CHARA Paper
- Instruments
- CHARA Community Access
- NOAO Proposal Information
- Schedules
- Observing Preparation
- Weather/Sky conditions
- Publications
- Map & Directions
- People

Time Available

In order to increase community awareness and support of optical interferometry, CHARA has offered nights for open-access through NOAO. The current count/status of open-access nights is shown in the following table.

2007B	2008A	2008B	2009A
-	-	-	-
2009B	2010A	2010B	2011A
-	5	-	5
2011B	2012A	2012B	2013A
	5		5

Center for High Angular Resolution Astronomy

The CHARA Array is located on Mount Wilson in the San Gabriel Mountains of Southern California. The Array utilizes the principles of optical and infrared interferometry to link its six 1-meter telescopes together to produce resolution equivalent to that of a single telescope more than 300 meters in diameter, making it the highest angular resolution optical telescope in the world. A complement of beam combiners offers interferometric capability in the range 0.5 to 2.5 microns. Multibeam combiners (up to six telescopes) support interferometric imaging.

Last updated or reviewed March 2, 2011.

https://www.noao.edu/gateway/chara/

National Optical Astronomy Observatory

Kitt Peak National Observatory • Cerro Tololo Inter-American Observatory • NOAO Gemini Science Center

Community Access to the CHARA Interferometer on Mt. Wilson

Announcement of Opportunity

NOAO and Georgia State University are announcing an opportunity for observations with the Center for High Angular Resolution Astronomy (CHARA) Array at Mt. Wilson Observatory. Twenty-five nights will be available during the 2018A observing semester (February 2017 - July 2018)

Requests should be submitted using the standard NOAO proposal form by selecting "CHARA" in the telescope list. Time should be requested in half-night increments, with a minimum allocation of 0.5 nights (about 5 hours). Observations will be carried out by CHARA staff, however, we encourage new observers to participate in making observations at Mt. Wilson observatory, and some travel support from GSU will be available on request for those who are awarded time.

What is the purpose of this call for proposals?

GSU/CHARA was awarded funding from the NSF Mid-Scale Innovations Program to provide community access to the CHARA observing program and data archive. This is intended to be an introductory opportunity, and previous experience with interferometry is not required. The number of available nights is expected to remain at about 25 per semester through semester 2021B.

CHARA capabilities and proposal preparation

The best way to study the capability of the instruments is to look over some of the science papers from the array. A bibliography of CHARA Array science is available: http://www.chara.gsu.edu/astronomers/publications/

The following table gives a high level view of the performance for the system and the most mature beam combiners. Please note that CHARA does not have offset tracking capability, and the science target must satisfy acquisition, tilt tracking, and beam combiner magnitude limits.

Mode	Telescopes	Band	Typical limit Mag=	Best performance Mag=	At Spectral Resolution R=
Acquisition	6	V-R	10.0	12.0	Broad band
Tilt tracking	6	V-R	10.0	12.0	Broad band
CLASSIC	2	H or K band	7.0	8.5	Broad band
CLIMB	3	H or K band	6.0	7.0	Broad band
JouFLU	2	K	4.5	5	Broad band
MIRC	6	H	4	6	42
PAVO	2	630-900 nm	7.0	8.0	30
VEGA (hi-res)	2 or 3	2 bands of 7nm (separation 30nm) in 520-850nm	4.0	5.0	30000
VEGA (med-res)	2 or 3	2 bands of 35nm (separation 160nm) in 520-850nm	6.5	7.5	6000

Steve Ridgway (ridgway@noao.edu) is the NOAO point of contact for proposal preparation, and he can steer you to more expert advice as needed.

The 6 CHARA telescopes provide 15 baselines, listed here. Normally a two-telescope combiner can be used with any two telescopes (one baseline), a 3-telescope combiner with any 3 telescopes (3 baselines), etc. The selection of telescopes can be changed during the night, within some limitations, provided it is part of the observing request and plan - please inquire for more specific information.

If you decide to prepare a proposal, you will probably want to look at the optical interferometry planning tools supported by the NASA Exoplanet Science Institute at http://nexsciweb.ipac.caltech.edu/gcWeb/gcWeb.jsp

The Jean-Marie Mariotti Center in Grenoble offers an interferometry planning tool Aspro which supports CHARA instruments. The JMMC also offers SearchCal, for selecting calibrator stars.

There are no reserved targets or science, though proposers may optionally be put in contact with groups pursuing similar programs. NOAO policy on data proprietary period will apply. According to current CHARA consortium policy, "Members of the CHARA collaboration may participate as collaborators on NOAO proposals and be listed as such in the text of proposals (but not as P.I. or Co-I. on the cover sheet)."

How much time is needed for an observation?

A single "snapshot", including calibrators, requires ~30-90 minutes. This may produce between one and several dozen UV points, depending on the instrument. This amount of data can determine, for example, an angular diameter, a limb darkening strength, a binary separation, or the fraction of emission in a shell.

This may not be well suited for survey programs, for time variable studies, or for imaging of complex sources, which typically might require larger observing allocations.

The observations

CHARA cannot guarantee productive observations, but is prepared to devote more telescope time than the allocated total in order to increase the odds of success.

All observing will be done by CHARA consortium staff. Visitors are encouraged to travel to the Array - however, observation dates may not adhere to an advance schedule. P.I.'s can apply for travel support once the time allocation process is complete -- contact CHARA Array Director Dr Theo ten Brummelaar (theo@chara-array.org).

Data reduction and analysis

Consortium members will also support data reduction to Optical Interferometry FITS format, though users will probably find it interesting and not difficult to run the reduction suites, either on a CHARA computer, or on their own Linux or Mac systems. Visibility modeling tools are available from the Exoplanet Science Institute at http://nexsciweb.ipac.caltech.edu/vmt/vmtWeb/, and from the Jean-Marie Mariotti Center at http://www.jmmc.fr/litpro_page.htm.

A very complete bibliography of interferometry science is available at the OLBIN website, http://jmmc.fr/bibdb/ , and may be the best guide for conventional ways to interpret data. However, optical interferometry is a young field and is wide open for new approaches.

2018B NOAO Call for Proposals

- 25 nights will be available during the 2018B observing semester (August – December, 2018)
- CHARA will be closed for the month of January
- Request minimum increments of 1/2 night
- No restricted targets
- 18 month proprietary period
- Deadline March 30, 2018
- Next 2019A: February-July, 2019

NOAO Proposal Process

http://ast.noao.edu/observing/call-for-proposals-2018a

- Proposals can be prepared on-line, or with a LaTeX template and submitted via upload.
- An advantage of on-line preparation is that the proposal will remain in the system for several years, and can be updated and resubmitted easily.

NOAO Interactive Proposal Form

- Abstract: 175 words
- Scientific justification: 1 page
- Experimental design: 1 page
- Other Facilities: 1/2 page
- Previous NOAO time: 1/2 page
- Figures: 3
- Target tables

Tips on how to write a proposal

- Lecture from Stan Metchev
  http://www.astro.sunysb.edu/metchev/PHY517_AST443/lecture6.pdf

- A sample proposal with in-line advice:

https://www.noao.edu/noaoprop/help/sample.pdf

Advice from Steve Ridgway

- The biggest question in a TAC's mind (or whatever serves as a TAC mind) is, what can you do with the data, and will you do it.

  The way to forestall concerns like that is to show with real or simulated data that you can carry out the post-observing work.

- No matter how carefully written, you can always make it a little more convincing next time.
- There is a funny effect – individual TAC members may forget details of your proposal, but notice that it is familiar, and in my experience, this can result in a kind of favorable bias.
- Many TAC decisions are decided by one vote, and TAC membership evolves continuously.
- Therefore, if you believe in your proposal, then as Winston Churchill supposedly said, but did not say, but could have said: “Never give up – never, never, never!”

CHARA Collaborators

- *CHARA staff can help you!*
- "Members of the CHARA collaboration may participate as collaborators on NOAO proposals and be listed as such in the text of proposals (but not as P.I. or Co-I. on the cover sheet).”
- Note: this is a current CHARA rule, intended to support broader community access, while enabling PIs to benefit from CHARA collaborators if they wish.

CHARA Array 2017B Observing Schedule

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
August			1 NOAO(C6) S1W1E1	2 NOAO(C6) S1W1E1	3 CL2 S1W1E1 ENG S2	4 CL2 S1W1E1	5 CL1 S1W1E1
	6 NOAO(C7) S1E1	7 NOAO(C7) E2W2 J1 S1S2	8 C1 E1W1 J1 S1S2	9 C1 S1W1E1	10 C1 S1W1E1 ENG S2	11 C1 S1W1E1	12 NOAO ALL (C5/P11)
	13 NOAO ALL (C5/P11)	14 C4 ALL P6	15 C4 ALL P6	16 M12 ALL	17 M12 ALL ENG S2	18 M12 ALL	19 M1 ALL
	20 M1 ALL	21 M14 ALL	22 M14 ALL	23 M14 ALL	24 V1 ALL ENG S2	25 V1 ALL	26 V1 ALL
	27 V1 ALL	28 V1 ALL	29 V1 ALL	30 V1 ALL	31 NOAO(CL5) S1E2W1 ENG S2	1 NOAO(CL5) S1E2W1	2 NOAO(CL6) S1W1E1 C2(1/2) ALL
September	3 NOAO(CL6) S1W1E1 C2(1/2) ALL	4 NOAO(CL6) S1W1E1 C2(1/2) ALL	5 NOAO(CL6) S1W1E1 J1(1/2) S1S2	6 CL2 E1E2W1W2 J1 S1S2	7 CL2 S1W1E1 P1 S2W2E2	8 CL1 S1W1E1 P1 S2W2E2	9 CL1 S1W1E1 P1 S2W2E2
	10 V2 ALL	11 V2 ALL	12 V2 ALL	13 V2 ALL	14 V2 ALL ENG TBD	15 V2 ALL	16 V2 ALL
	17 M12 ALL	18 M12 ALL	19 M12 ALL	20 M12 ALL	21 M11 ALL ENG TBD	22 M11 ALL	23 M11 ALL
	24 M11 ALL	25 M11 ALL	26 M9 ALL	27 M9 ALL	28 M9 ALL ENG TBD	29 M9 ALL	30 M9 ALL
October	1 CL1 S1W1E1	2 CL2 S1W1E1	3 M10 ALL	4 M10 ALL	5 M10 ALL ENG TBD	6 M10 ALL	7 M10 ALL
	8 M10 ALL	9 M10 ALL	10 M10 ALL	11 V3 ALL	12 V3 ALL ENG TBD	13 V3 ALL	14 V3 ALL
	15 V3 ALL	16 V3 ALL	17 V3 ALL	18 P10 S1S2 C1 E1W1	19 C1 S1E1 ENG TBD	20 C1 S1E1	21 ALOHA ALL
	22 ALOHA ALL	23 ALOHA ALL	24 M8 ALL M15	25 M8 ALL	26 M8 ALL M15 ENG TBD	27 M8 ALL	28 C4 ALL P6
	29 C4 ALL P6	30 M15 ALL	31 NOAO ALL (C5/P11)	1 M3 ALL	2 M3 ALL ENG TBD	3 M3 ALL	4 M3 ALL
November	5 V4 ALL	6 V4 ALL	7 V4 ALL	8 V4 ALL	9 V4 ALL ENG TBD	10 V4 ALL	11 V4 ALL
	12 P10 S1S2E1E2 V8	13 M13 ALL	14 M7 ALL	15 M13 ALL	16 M15 ALL ENG TBD	17 M13 ALL	18 M1 ALL
	19 M1 ALL	20 CL4 ALL P3 ANY	21 CL4 ALL P3 ANY	22 P9 ALL	23	24 P9 ALL	25 P9 ALL
	26 P7 E2W1W2 J1 S1S2	27 P7 E2W1W2 J1 S1S2	28 P7 E2W1W2 J1 S1S2	29 P1 S2W2E2 CL2 S1W1E1	30 P1 S2W2E2 NOAO(C6) S1W1E1	1 P1 S2W2E2 NOAO(C6) S1W1E1	2 P1 S2W2E2 NOAO(C7) S1W1E1
December	3 P1 S2W2E2 NOAO(C7) S1W1E1	4 V5 ALL	5 V5 ALL	6 V5 ALL	7 V5 ALL ENG TBD	8 V5 ALL	9 V5 ALL
	10 V5 ALL	11 M7 ALL	12 M11 ALL	13 M11 ALL	14 M11 ALL ENG TBD	15 M11 ALL	16 M11 ALL
	17 CL3/P5 ALL J2	18 CL3/P5 ALL J2	19 CL3/P5 ALL J2	20 P2 S2W2E2 CL2 S1W1E1	21 P2 S2W2E2 CL2 S1W1E1	22 P4 E1E2W1W2 J1 S1S2	23 P4 E1E2W1W2
	24	25	26	27	28	29	30
	31						Olli Norm Chris

CHARA Array 2017B Observing Proposal Summary

Program Number	PI	Co-I's	Title	Dates Assigned
CHARA Classic Programs				
C1	Kervella	Merand, Trahin, Borginet, Gallenne, Nardetto	Completion of the CHARA/VLTI Interferometric Cepheid Survey in a view of GAIA's Parallaxes	Aug 8-11, Oct 18-20
C2	Kishimoto	ten Brummelaar, Farrington, Anderson	Resolving the nature of the AGN Torus	Sept 2-4 (2nd half)
C4/P6	Boyajian/von Braun	Ellis, ten Brummelaar, Farrington, McAlister, Gies, van Belle, R. White, Jones, Ireland, Huber, Fischer	Diameters and temperatures of Main-Sequence FG Stars	Aug 14-15, Oct 28-29
NOAO(C5/P11)	von Braun	Boyajian, van Belle, Ellis	Radii of late-type dwarfs, exoplanet hosts, and exoplanet host candidates	Aug 12-13, Oct 31
NOAO(C6)	Kaminski		Stellar Radii of M-dwarfs	Aug 1-2, Nov 30-Dec1
NOAO(C7)	Baines	Zielenski, Vanko, Niedzielski, Wolszczan	Measuring Candidate Exoplanet Host Star Radii	Aug 6-7, Dec 2-3
CLIMB Programs				
CL1	Farrington	ten Brummelaar, Mason, Schaefer, Gies, Fekel	Long Term Monitoring of Massive and SFP Binaries	Aug 5, Sept 8-9, Oct 1
CL2	Lester	Farrington, Gies, Schaefer	Astrophysical Parameters for A- and F-type Stars in Spectroscopic Binaries	Aug 3-4, Sept 6-7, Oct 2, Nov 29, Dec 20-21
CL3/P5/J2	Baron	Ireland, Casagrande, Huber, ten Brummelaar, Boyajian	PAVO vs JOUFLU vs CLIMB: Stellar diameters and systematic errors	Dec 17-19
CL4/P9	White	Huber, Baron, Vrijmoet, Ireland, Tuthill, Bedding, Aufdenberg, Baines, Collet, Neilson	Measuring limb-darkening at visible wavelengths with CHARA	Nov 20-21
NOAO(CL5)	Richardson	Moffat, Williams, Shenar, St-Louis	Weighing Evolved Massive Stars in Binary Systems with Interferometry	Aug 31-Sept 1
NOAO(CL6)	Leutenegger	Cohen, Gagne, Sana	Search for long period companions of putatively single X-ray emitting WR stars	Sept 2-5 (1st half)
JOUFLU Programs				
ALOHA	Reynaud	Ludovic Grossard MC	ALOHA @ 1.55 and 3.39 microns	Oct 21-23
J1	Scott	ten Brummelaar, Mennesson, Nunez, Coude du Foresto, Absil	Monitoring of Known Variable Exozodiacial Disks	Aug 7-8, Sept 5-6, Nov 26-28, Dec 22
J2/CL3/P5	Baron	Ireland, Casagrande, Huber, ten Brummelaar, Boyajian	PAVO vs JOUFLU vs CLIMB: Stellar diameters and systematic errors	Dec 17-19

Observing at CHARA

http://www.chara.gsu.edu/observers

- Contact CHARA staff to help design program and set optical configurations
- Plan to visit MWO to help with observations (travel support available) OR be available for live Skype session with operators/astronomers
- VEGA programs merged
- CHARA archive will soon be available
- Data reduction and analysis packages available
- Journal of past observations at JMMC: http://oidb.jmmc.fr/index.html

Key Contacts

proposals, pre- and post-observing

- Gail Schaefer
  CHARA Visitor Support Scientist
  schaefer@chara-array.org
- Jeremy Jones
  CHARA Data Scientist
  jones@chara.gsu.edu
- Steve Ridgway
  CHARA/NOAO Liason
  ridgway@noao.edu

VLTI Proposal Submissions

- Bi-annual call-for-proposals
- https://www.eso.org/sci/facilities/paranal/cfp/cfp101.html
- Proposals due end of March 2018 → observation Oct. 2018/March 2019
- ATs = 4 movable 1.8m telescopes
- UTs = 4 fixed 8m telescopes (add + 2mag)
- Combiners: AMBER (3T, H+K), GRAVITY (4T, K) PIONIER (4T, H)
- Helpful to have a European collaborator

ESO non-member state proposal

- If at least 2/3 of the applicants are not affiliated to ESO member institutes, the following apply:
- The proposal has to be scientifically outstanding.
- The required instrumentation is not available at any other observatory accessible to the applicants.
- If similar proposals of ESO members states are rated equally, preference will be given to those.
- ESO will only grant financial support to astronomers affiliated to ESO member institutes.

CHARA Research
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CHARA Collaboration Members

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