

# Christopher D. Farrington, Ph.D.

## Current Position:

- Research Technician / Telescope Operator, The CHARA Array, Mount Wilson, CA

## Research Interests:

- Optical and infrared interferometry, stellar spectroscopy, binary and multiple star systems, subgiants and subdwarfs, astrometry, fundamental stellar properties

## Education:

- 2008 – PhD, Astronomy from Georgia State University, Advisor: Hal McAlister
- 2004 – Masters of Science, Astronomy, Georgia State University
- 2002 – Bachelor of Science, Physics (Astronomy Concentration / Honors), Georgia State University, Cum Laude.
- 1994-2000 – Mechanical/Nuclear Engineering, Georgia Institute of Technology, transferred.

## Ph.D. Thesis:

- Title – *The Separated Fringe Packet Survey: Updating Multiplicity of Solar-Type Stars within 22 Parsecs*
- Advisor – Dr. H. A. McAlister, Regent’s Professor, Georgia State University
- Description – Developed and implemented a method to search for undiscovered companions to solar-type stars within 22 parsecs in the regime between speckle interferometry and spectroscopic surveys.

## Relevant Experience:

- Operator of the CHARA Array, 2006-Present. Alignments of the optical subsystems, supervise data collection, troubleshoot mechanical and software problems, assist PI’s with general operations, and personal observational research projects with the CHARA Array.
- Research Assistant, Georgia State University, developing SFP technique.
  - Advisor: Harold A. McAlister, 2005-2008.
  - Other Research: Stellar radii, Be star disks, binary star orbits
- Research Assistant, Georgia State University, 2002-2005:
  - Optical design of CHARA Array beam samplers, Advisor: Harold A. McAlister
  - Cataloging of Active Galactic Nuclei, Advisor: Mike Crenshaw
- Student Assistant, Georgia State University, Advisor: William Bagnuolo, 2001-2002
  - Optical design, Multi-Telescope Telescope (MTT), HLC Observatory, Rutledge, GA

## Professional Affiliations:

- Society of Physics Students (SPS) member since 2000
- American Astronomical Society (AAS), sponsored member since 2005-2008, full member 2008-present

## Grants and Study Abroad/Travel:

- Fizeau Fellowship (European Initiative for Interferometry, Nice, France) Winter 2012
- Financial support for current CHARA operator position fully provided by NASA Exoplanet Science Center (NexSci, formerly Michelson Science Center) 2006-2011
- American Astronomical Society (AAS) meetings, Winter 2007-2008
- Michelson Summer Workshop (MSW), Caltech, Summers 2005-2007
- “Annual” CHARA Spring Science Meetings March 2005-2013

## Personal Interests:

- Music – Nightclub DJ semi regularly since 2002, live electronic band member from 2004-2008
- Animals – Fiancée and I run a sighthound kennel for conformation and lure coursing shows for Whippets
  - [triplestarhounds.com](http://triplestarhounds.com)

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## Selected Publications

### Refereed Journals:

1. *Separated Fringe Packet Observations with the CHARA Array I: Methods and New Orbits for Chi Draconis, HD 184467, and 198084*, **Farrington, C. D.**, ten Brummelaar, T. A., Mason, B. D., Turner, N., McAlister, H. A., *The Astrophysical Journal*, Volume 139, pp. 2308-2318, 2010
2. *The Separated Fringe Packet Survey*, **Farrington, C. D.**, McAlister, H. A., ten Brummelaar, T. A., , (in preparation)
3. *Separated Fringe Packet Observations with the CHARA Array II: HR 417, HR 7272 and HR 8417*, **Farrington, C.D.**; ten Brummelaar, T.A.; Mason, B.D.; Turner, N. H.; Griffin, R. (in preparation)
4. *Separated Fringe Packet Observations with the CHARA Array III: HD 16811 and HD 181655*, **Farrington, C.D.**; ten Brummelaar, T.A.; Mason, B.D.; Turner, N. H.; Bagunolo, W.; (in preparation)
5. *The GJ 436 System: Directly Determined Astrophysical Parameters of an M Dwarf and Implications for the Transiting Hot Neptune*, von Braun, K.; Boyajian, T. S.; Kane, S. R.; Hebb, L.; van Belle, G. T.; **Farrington, C. D.**; Ciardi, D.R.; Knutson, H.; ten Brummelaar, T.A.; López-Morales, M.; McAlister, H.A.; Schaefer, G.; Ridgway, S.; Collier C., Andrew; Goldfinger, P. J.; Turner, N.H.; Sturmann, L.; Sturmann, J.; *The Astrophysical Journal*, Volume 753, Issue 2, 171, 2012
6. *Stellar Diameters and Temperatures. I. Main-sequence A, F, and G Stars*, Boyajian, T.S.; McAlister, H.A.; van Belle, G.; Gies, D.R.; ten Brummelaar, T.A.; von Braun, K.; **Farrington, C.D.**; Goldfinger, P. J.; O'Brien, D.; Parks, J. R.; Richardson, N.D.; Ridgway, S.; Schaefer, G.; Sturmann, L.; Sturmann, J.; Touhami, Y.; Turner, N.H.; White, R.; *The Astrophysical Journal*, Volume 746, Issue 1, 101, 2012
7. *A Search for Separated Fringe Packet Binaries Using the CHARA Array*, Raghavan, D.; **Farrington, C.D.**; ten Brummelaar, T.A.; McAlister, H.A.; Ridgway, S.T.; Sturmann, L.; Sturmann, J.; Turner, N.H.; *The Astrophysical Journal*, Volume 745, Issue 1, 24, 2012
8. *An Interferometric and Spectroscopic Analysis of the Multiple Star System HD 193322*, ten Brummelaar, T. A.; O'Brien, D. P.; Mason, B. D.; **Farrington, C. D.**; Fullerton, A. W.; Gies, D. R.; Grundstrom, E. D.; Hartkopf, W. I.; Matson, R. A.; McAlister, H. A.; McSwain, M. V.; Roberts, L. C.; Schaefer, G. H.; Simón-Díaz, S.; Sturmann, J.; Sturmann, L.; Turner, N. H.; Williams, S. J. *The Astrophysical Journal*, Volume 142 pp. 21, 2011
9. *Infrared images of the transiting disk in the  $\epsilon$  Aurigae system*, Kloppenborg, B., Stencel, R., Monnier, J.D., Schaefer, G., Zhao, M., Baron, F., McAlister, H., ten Brummelaar, T., Che, X., **Farrington, C.**, Pedretti, E., Sallave-Goldfinger, P.J., Sturmann, J., Sturmann, L., Thureau, N., Turner, N., Carroll, S.M., *Nature*, Volume 464, pp. 870-872, Apr 2010.

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10. *Interferometric Observations of the Hierarchical Triple System Algol*, Csizmadia, S., Borkovits, T., Paragi, Z., Sturmann, L., Sturmann, J., **Farrington, C.D.**, McAlister, H.A., ten Brummelaar, T.A., Turner, N.H., *The Astrophysical Journal*, Volume 705, pp. 436-445, 2009.
11. *Imaging and Modeling Rapidly Rotating Stars:  $\alpha$  Cephei and  $\alpha$  Ophiuchi*, Zhao, M., Monnier, J. D., Pedretti, E., Thureau, N., Mérand, A., Ten Brummelaar, T., McAlister, H., Ridgway, S. T., Turner, N., Sturmann, J., Sturmann, L., Goldfinger, P. J., **Farrington, C.D.**, *The Astrophysical Journal*, Volume 701, Issue 1, pp. 209-224 (2009).
12. *Asteroseismology and interferometry of the red giant star  $\epsilon$  Ophiuchi*, Mazumdar, A., Mérand, A., Demarque, P., Kervella, P., Barban, C., Baudin, F., Coudé Du Foresto, V., **Farrington, C.D.**, Goldfinger, P. J., Goupil, M.-J., Josselin, E., Kuschnig, R., McAlister, H. A., Matthews, J., Ridgway, S. T., Sturmann, J., Sturmann, L., Ten Brummelaar, T. A., Turner, N., *Astronomy and Astrophysics*, Volume 503, Issue 2, 2009, pp.521-531.
13. *Angular Diameters of the Hyades Giants Measured with the CHARA Array*, Boyajian, T. S., McAlister, H. A., Cantrell, J. R., Gies, D. R., ten Brummelaar, T. A., **Farrington, C. D.**, Goldfinger, P. J., Sturmann, L., Sturmann, J, Turner, N., Ridgway, S., *The Astrophysical Journal*, Volume 691, Issue 2, pp. 1243-1247, 2009.
14. *The Visual Orbit of the 1.1 Day Spectroscopic Binary  $\sigma^2$  Coronae Borealis from Interferometry at the CHARA Array*, Raghavan, D., McAlister, H. A., Torres, G., Latham, D. W., Mason, B. D., Boyajian, T. S., Baines, E. K., Williams, S. J., ten Brummelaar, T. A., **Farrington, C. D.**, Ridgway, S. T., Sturmann, L., Sturmann, J., Turner, N. H., *The Astrophysical Journal*, Volume 690, Issue 1, pp. 394-406, 2009.
15. *Angular Diameters of the G Subdwarf  $\mu$  Cassiopeiae A and the K Dwarfs  $\sigma$  Draconis and HR 511 from Interferometric Measurements with the CHARA Array*, Boyajian, T. S., McAlister, H. A., Baines, E. K., Gies, D. R., Henry, T., Jao, W., O'Brien, D., Raghavan, D., Touhami, Y., ten Brummelaar, T. A., **Farrington, C. D.**, Goldfinger, P. J., Sturmann, L., Sturmann, J., Turner, N. H., Ridgway, S., *The Astrophysical Journal*, Volume 683, Issue 1, pp. 424-432, 2008.
16. *The Long-Period, Massive Binaries HD 37366 and HD 54662: Potential Targets for Long-Baseline Optical Interferometry*, Boyajian, T. S., Gies, D. R., Dunn, J. P., **Farrington, C. D.**, Grundstrom, E. D., Huang, W., McSwain, M. V., Williams, S. J., Wingert, D. W., Fullerton, A. W., Bolton, C. T., *The Astrophysical Journal*, Volume 664, Issue 2, pp. 1121-1129, 2007.
17. *CHARA Array K'-Band Measurements of the Angular Dimensions of Be Star Disks*, Gies, D. R., Bagnuolo, W. G., Jr., Baines, E. K., ten Brummelaar, T. A., **Farrington, C. D.**, Goldfinger, P. J., Grundstrom, E. D., Huang, W., McAlister, H. A., Mérand, A., Sturmann, J., Sturmann, L., Touhami, Y., Turner, N. H., Wingert, D. W., Berger, D. H., McSwain, M. V., Aufdenberg, J. P., Ridgway, S. T., Cochran, A. L., Lester, D. F., Sterling, N. C., Bjorkman, J. E., Bjorkman, K. S., Koubský, P., *The Astrophysical Journal*, Volume 654, Issue 1, pp. 527-543, 2007.
18. *An Internet Database of Ultraviolet Continuum Light Curves for Seyfert Galaxies*, Dunn, J. P., Jackson, B., Deo, R. P., **Farrington, C.**, Das, V., Crenshaw, D. M., *The Publications of the Astronomical Society of the Pacific*, Volume 118, Issue 842, pp. 572-579, 2006.

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## Conference Proceedings:

1. *Data analysis for the CHARA Array CLIMB beam combiner*, ten Brummelaar, T.A.; Sturmman, J.; McAlister, H.A.; Sturmman, L.; Turner, N.H.; **Farrington, C.D.**; Schaefer, G.; Goldfinger, P. J.; Kloppenborg, B.; *Optical and Infrared Interferometry III*. Proceedings of the SPIE, Volume 8445, 84453C, 2012
2. *Diameters and Temperatures of Main-Sequence Stars*, Boyajian, T.S.; McAlister, H.; von Braun, K.; van Belle, G.; Gies, D.; ten Brummelaar, T.; **Farrington, C.D.**; Goldfinger, P.; Ridgway, S.; Sturmman, L.; Sturmman, J.; Schaefer, G.; Turner, N.; *American Astronomical Society*, AAS Meeting #218, #323.06; Bulletin of the American Astronomical Society, Vol. 43, 2011
3. *Interferometric Images Of The Transiting Disk In The Epsilon Aurigae System*, Kloppenborg, B.K.; Stencel, R.; Monnier, J. D.; Schaefer, G.; Zhao, M.; Baron, F.; McAlister, H.; ten Brummelaar, T.; Che, X.; **Farrington, C.D.**; Pedretti, E.; Sallave-Goldfinger, P.; Sturmman, J.; Sturmman, L.; Thureau, N.; Turner, N.; Carroll, S.; *American Astronomical Society*, AAS Meeting #217, #257.03; Bulletin of the American Astronomical Society, Vol. 43, 2011
4. *Separated Fringe Packet Observations with the CHARA Array*, **Farrington, Christopher D.**; ten Brummelaar, T. A.; Mason, B. D.; Hartkopf, W. I.; McAlister, H. A.; Raghavan, D.; Turner, N. H.; Sturmman, L.; Sturmman, J.; Ridgway, S. T., *American Astronomical Society*, AAS Meeting #215, #419.14; Bulletin of the American Astronomical Society, Vol. 42, p.278, 2010
5. *Massive Star Studies with the CHARA Array*, Gies, D., Boyajian, T., **Farrington, C.**, McAlister, H., O'Brien, D., Richardson, N., Raghavan, D., Schaefer, G., ten Brummelaar, T., Touhami, Y., Turner, N., *The Interferometric View on Hot Stars* (Eds. Th. Rivinius & M. Curé) Revista Mexicana de Astronomía y Astrofísica (Serie de Conferencias) Vol. 38, pp. 133-133, 2010
6. *Fundamental Properties of Low Mass Stars*, Boyajian, Tabettha S., von Braun, K., van Belle, G., ten Brummelaar, T., Ciardi, D., **Farrington, C.**, Goldfinger, P., López-Morales, M., McAlister, H., Ridgway, S., Sturmman, L., Sturmman, J., Turner, N., *American Astronomical Society*, AAS Meeting #215, #424.21; Bulletin of the American Astronomical Society, Vol. 42, p.334, 2010
7. *VEGA: a new visible spectrograph and polarimeter on the CHARA Array*, Mourard, D., Perraut, K., Bonneau, D., Clause, J. M., Stee, Ph., Tallon-Bosc, I., Kervella, P., Hughes, Y., Marcotto, A., Blazit, A., Chesneau, O., Domiciano de Souza, A., Foy, R., Hénault, F., Mattei, D., Merlin, G., Roussel, A., Tallon, M., Thiebaut, E., McAlister, H., ten Brummelaar, T., Sturmman, J., Sturmman, L., Turner, N., **Farrington, C.**, Goldfinger, P. J., *Optical and Infrared Interferometry*. Edited by Schöller, Markus, Danchi, William C., Delplancke, Françoise. Proceedings of the SPIE, Volume 7013, pp. 701323-701323-12, 2008.
8. *Orbital Analysis of Separated Fringe Packet Binaries using the CHARA Array*, **Farrington, C. D.**, McAlister, H. A., ten Brummelaar, T. A., *American Astronomical Society*, AAS Meeting #211, #57.06, Bulletin of the American Astronomical Society, Vol. 39, p.831, 2007.

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9. *CHARA Array Observations of Be Stars and Regulus*, Gies, D. R., Baines, E. K., Berger, D. H., **Farrington, C.**, Grundstrom, E. D., Huang, W., McAlister, H. A., Ten Brummelaar, T. A., McSwain, M. V., *Active OB-Stars: Laboratories for Stellar and Circumstellar Physics*, ASP Conference Series, Vol. 361, Proceedings of the conference held 29 August - 2 September, 2005 at Hokkai-Gakuen University, Sapporo, Japan. Edited by S. Stefl, S. P. Owocki, and A. T. Okazaki. San Francisco: Astronomical Society of the Pacific, 2007., p.307
10. *Applications of separated fringe packets to binary star studies with the CHARA Array: Preliminary thesis report*, **Farrington, C. D.**, McAlister, H. A., *Advances in Stellar Interferometry*. Edited by Monnier, John D.; Schöller, Markus; Danchi, William C.. Proceedings of the SPIE, Volume 6268, 2006.

**Google Scholar link:** <http://scholar.google.com/citations?user=IWhvqOsAAAAJ>

## Project Experience

### Science (2008-Present):

1. Project Lead: Acted as PI for CHARA Array's Separated Fringe Packet (SFP) binary program (15-120 milliarcseconds). Handled planning, observing, data reduction and publication of orbits. Managed observing database of 100+ targets, mostly long period binaries (200-5000 days).
2. Project Participant: Actively participated in multiple interferometry projects across various instruments available at the CHARA Array. Responsible for planning, data collection, data reduction, proofreading, adjustments to science case for projects on CLIMB (Classic Interferometry on Multiple Baselines, IR 3-way pairwise beam combiner), Classic (IR 2-beam combiner), VEGA (Visible spEctroGraph and polArimeter, visible 4-beam pairwise combiner), and MIRC (Michigan InfraRed Combiner, IR 6-beam pairwise combiner). Subject examples: Stellar diameters, short period (<100 days), star spot imaging,  $\epsilon$  Auriga transit, rapid rotators.

### Technical (2006-Present):

1. Scheduling and Oversight: In 2009, I assumed the responsibility of taking the 40+ observing proposals for each observing season and creating an observing schedule. This included laying out the individual programs sent by the Director that had passed the science committee, ensuring the time that was requested was given appropriately and in the correct amounts and did not conflict with time specifically denoted unavailable. As each instrument is only available on certain beams and specific wavelengths, care must be taken to ensure that simultaneously scheduled programs were on selected beams that do not overlap. Furthermore, programs need to be scheduled in such a way that telescope selection for each program is not assigned the same telescopes, and that the baselines are scientifically significant for the observations attempted. Interpersonal skills are necessary to resolve problems with scheduling between the instrument PI's and the more than 30 project PI's involved if compromise is needed for telescope assignments or time conflicts and managing simultaneous observations when multiple programs were assigned on the same night.
2. Optical Setup: On any given night, the "at use" instruments and optical beam train must be aligned on the optical axis of the lab fiducial laser. This includes telescope configuration, fixed baseline length changes, and alignment of the 21 mirror beam train/optical lab. There are currently five separate instruments in the CHARA optical laboratory each of which has its own alignment procedure and baseline requirements which need to be followed for observation to commence.

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3. Observational support: The CHARA Array runs 1-3 beam combiners simultaneously on different telescopes on different targets and any of those are able to be operated remotely from facilities in Grasse and Paris (FR), Sydney (AU), Atlanta, GA, and Ann Arbor, MI (US). Generally there are always two instruments running, using two to four telescopes at a time each with their own program and operational needs. Operators coordinate with each team, onsite or remote, and acquire targets, and reconfigure their instrument or alignment if needed. When no PI is available to observe for their program, operators not only support the onsite or remote secondary program, but to do all the observing, data recording, and logging for that program according to their strategy. Operators are also responsible for opening, securing, and closing the individual telescopes at startup/shutdown and have final decision on inclement weather conditions that may affect the telescopes, mirror coatings or facilities.
4. Troubleshooting/Supervising: All software in use by the Array was written and developed in-house using RT/Linux and has many known issues that can arise during an observing session. Much of the hardware is custom made and operators are required to know how to fix, replace or circumvent technical problems so that observations can continue. Multiple sub-systems running in separate buildings around the observatory can require constant supervision during observing. Our laser metrology system for movable cart positioning requires precise alignment over up to 80m of beam path that must sometimes be realigned from scratch if something is out of place. If something is not working properly and is impeding observations, operators trained to fix all but the most serious alignment, technical or software problems.

## Contact Information for References:

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