

# GAGANDEEP S. ANAND

Senior Staff Scientist  $\diamond$  [ganand@stsci.edu](mailto:ganand@stsci.edu)  $\diamond$  [gsanand.github.io](https://gsanand.github.io)

## RECENT EMPLOYMENT

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**Senior Staff Scientist**

Apr. 2024 – Present

**Staff Scientist II**

Aug. 2021 – Apr. 2024

Employed at the Space Telescope Science Institute (Baltimore, MD) as a Senior Staff Scientist working as a member of the Advanced Camera for Surveys team on the Hubble Space Telescope.

## EDUCATION

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**Institute for Astronomy, University of Hawaii**

*December 2018/August 2021*

MS/PhD in Astronomy

Thesis: Tip of the Red Giant Branch Distances to Nearby Galaxies

Advisor: R. Brent Tully

**Boston University**

*May 2017*

M.A. in Astronomy

**Vassar College**

*May 2015*

A.B. in Astronomy & Physics, Minor in Mathematics

## PREVIOUS RESEARCH POSITIONS

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Graduate Research Assistant, University of Hawaii

Aug. 2017 – Aug. 2021

Visiting Graduate Research Fellow, IPAC/Caltech

Feb. 2020 – July 2020

Visiting Scholar, W.M. Keck Observatory

July 2017 – Aug. 2017

Graduate Researcher, Boston University

July 2015 – May 2017

Summer Researcher, Colby College

May 2014 – Aug. 2014

Observatory Assistant, Vassar College

Sept. 2011 – May 2015

## COMPUTATIONAL SKILLS

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Operating Systems

MacOS/OS X, UNIX/Linux, Windows

Computer Languages

Python, L<sup>A</sup>T<sub>E</sub>X, IDL

Astronomical Software

DOLPHOT, DrizzlePac, DS9, CIAO, GALFIT, IRAF, XSPEC

Amazon Web Services

API Gateway, Amplify, EC2, IAM, Lambda, S3

Miscellaneous Software/Tools

Git, Lightroom

## PUBLICATION SUMMARY

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[NASA/ADS Link to All Publications](#)

46 Refereed Publications (8 as first author)

3 Papers Under Review (1 as first author)

4 Instrument Science Reports (3 as first author)

2600+ Citations (370+ as first author), h-index = 20

## HONORS/AWARDS

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George and Mona Elmore Award for Research in Astronomy	ARCS Foundation, 2020
IPAC/Caltech Visiting Graduate Fellowship	IPAC/Caltech, 2020
W. M. Keck Observatory Visiting Scholarship	Keck Observatory, 2017
Departmental Honors in Astronomy	Vassar College, 2015

## GRANT MONEY AWARDED

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JWST Cycle 2, GO-3055— \$243,826 to G. Anand (STScI Grant PI)	JWST, 2023
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## OBSERVING TIME AWARDED

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JWST Cycle 3, GO-5989 (Co-I): The JWST SBF Coma Cluster Survey: Building an Alternative Precision Distance Ladder for Cosmology, 29.7 hours, PI J. Jensen	JWST, 2024
JWST Cycle 2, GO-3707 (Co-I): A JWST Census of the Local Galaxy Population: Anchoring the Physics of the Matter Cycle, 148.8 hours, PI A. Leroy	JWST, 2023
JWST Cycle 2, GO-3055 (Co-I): A TRGB Calibration of Surface Brightness Fluctuations, 46.8 hours, PI R. Tully	JWST, 2023
HST Cycle 31, GO-17502 (Co-I): Resolving gas, star formation and feedback in nearby galaxies with an HST+JWST+ALMA Treasury, 169 orbits, PI D. Thilker	HST, 2023
HST Cycle 31, GO-17520 (Co-I): A 1% cross-calibration of Cepheids, TRGB, and JAGB in five nearby galaxies with HST, 33 orbits, PIs L. Breuval & A. Riess	HST, 2023

## SELECT RECENT MEDIA COVERAGE

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<a href="#">JWST Affirms Universe's Expansion Rate, Puzzle Persists</a>	NASA/JWST 2024
<a href="#">JWST Deepens Mystery of Hubble Constant Tension</a>	NASA/JWST, 2023
<a href="#">JWST Reveals Networks of Gas and Dust in Nearby Galaxies</a>	NASA/Hubble, 2023
<a href="#">Peekaboo! Tiny, Hidden Galaxy Provides a Peek Into the Past</a>	NASA/Hubble, 2022
<a href="#">Investigating A Made-to-Measure Galaxy</a>	ESA/Hubble, 2022
<a href="#">Astronomers Map Distances to 56,000 Galaxies</a>	University of Hawaii, 2022

## OUTREACH ACTIVITIES

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ESA/Hubble Picture of the Week Series	2019–Present
Institute for Astronomy, Misc. Outreach Activities	2017–2021
Boston University Astronomy Open Nights	2015–2017
Vassar College Astronomy Open Nights	2011–2015

## PROFESSIONAL MEMBERSHIPS

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American Astronomical Society, Full Member	2021–Present
American Astronomical Society, Junior Member	September 2016–2021

## PROFESSIONAL SERVICE

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Referee	Astrophysical Journal (4+ papers), July 2018–Present
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## TEACHING EXPERIENCE

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### Department of Astronomy

*Teaching Fellow*

Sept. 2015 –May 2017

*Boston University*

- Astronomy 203- Principles of Astronomy II (Spring 2017)
- Astronomy 109- Cosmology (Fall 2015/Fall 2016)
- Astronomy 105- Alien Worlds (Spring 2016)

### Department of Physics & Astronomy

*Astronomy Academic Intern*

Sept. 2014 –May 2015

*Vassar College*

- Astronomy 105- Stars, Galaxies, & Cosmology (Spring 2015)
- Astronomy 101- Solar System Astronomy (Fall 2014)

## INSTRUMENT SCIENCE REPORTS

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### The ACS/WFC Focus-Diverse ePSF Webtool

Anand, G. S., Grogin, N., Anderson, J., Cohen, Y., & Bellini, A., [Instrument Science Report, ACS, 2023-06](#)

### Systematic Effects in ACS/WFC Absolute Gain Measurements

Anand, G. S., Grogin, N., Anderson, J., & Ryon J., [Instrument Science Report, ACS, 2023-02](#)

### Improved Absolute Astrometry for ACS and WFC3 Data Products

Mack, J., Hack, W., Burger, M., White, R. L., Bajaj, V., Avila, R. J., Anand, G. S., de la Pena, M., [Instrument Science Report, ACS, 2022-03](#)

### Revisiting ACS/WFC Sky Backgrounds

Anand, G. S., Grogin, N., & Anderson, J., [Instrument Science Report, ACS, 2022-01](#)

## FIRST AUTHOR PUBLICATIONS

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### The Population II Extragalactic Distance Scale: A TRGB Distance to the Fornax Cluster with JWST

Anand, G. S., Tully, R. B., Cohen, Y., et al., [Submitted to ApJ](#)

### Tip of the Red Giant Branch Distances with JWST: An Absolute Calibration in NGC 4258 and First Applications to Type Ia Supernova Hosts

Anand, G. S., Riess, A. G., Yuan, W., et al., [ApJ](#)

### Comparing Tip of the Red Giant Branch Distance Scales: An Independent Reduction of the Carnegie-Chicago Hubble Program and the Value of the Hubble Constant

Anand, G. S., Tully, R. B., Rizzi, L., Riess, A. G., & Yuan, W., 2022, [ApJ](#)

### The Extragalactic Distance Database: The Color-Magnitude Diagrams and Tip of the Red Giant Branch Distances Catalog

Anand, G. S., Rizzi, L., Tully, R. B., et al., 2021, [AJ](#)

### Distances to PHANGS Galaxies: New Tip of the Red Giant Branch Measurements and Adopted Distances

Anand, G. S., Lee, J., Van Dyk, S., et al., 2021, [MNRAS](#)

### Peculiar Velocities of Galaxies Just Beyond the Local Group

Anand, G. S., Tully, R. B., Rizzi, L., Shaya, E., & Karachentsev, I. D., 2019, [ApJ](#)

### **The Distance and Motion of the Maffei Group**

*Anand, G. S., Tully, R. B., Rizzi, L., & Karachentsev, I. D., 2019, [ApJL](#)*

### **A Robust Tip of the Red Giant Branch Distance to the Fireworks Galaxy (NGC 6946)**

*Anand, G. S., Rizzi, L., & Tully, R. B., 2018, [AJ](#)*

### **The Distance to the Galaxy Coma P**

*Anand, G. S., Tully, R. B., Karachentsev, I. D., Makarov, D. I., Makarova, L.; Rizzi, L.; Shaya, E. J., 2018, [ApJL](#)*

## **CO-AUTHOR PUBLICATIONS**

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### **Small Magellanic Cloud Cepheids Observed with the Hubble Space Telescope Provide a New Anchor for the SH0ES Distance Ladder**

*Breuval, L., Riess, A. G., Casertano, S., [5 authors], Anand, G. S., [1 authors], [Submitted to ApJ](#)*

### **PHANGS-JWST: Data Processing Pipeline and First Full Public Data Release**

*Williams, T. G., Lee, J. C., Larson, K. L., [10 authors], Anand, G. S., [42 authors], [Submitted to ApJS](#)*

### **Reconnaissance of the J-region Asymptotic Giant Branch in Five Nearby Galaxies using JWST**

*Li, S., Riess, A. G., Casertano, S., Anand, G. S., Scolnic, D., Breuval, L., Huang, C. D., [ApJ](#)*

### **JWST Observations Reject Unrecognized Crowding of Cepheid Photometry as an Explanation for the Hubble Tension at $8\sigma$ Confidence**

*Riess, A. G., Anand, G. S., Yuan, W., Casertano, S., Dolphin, A., Macri, L., Breuval, L., Scolnic, D., Perrin, M., & Anderson, R., 2024, [ApJL](#)*

### **Crowded No More: The Accuracy of the Hubble Constant Tested with High Resolution Observations of Cepheids by JWST**

*Riess, A. G., Anand, G. S., Yuan, W., Casertano, S., Dolphin, A., Macri, L., Breuval, L., Scolnic, D., Perrin, M., & Anderson, R., 2023, [ApJL](#)*

### **Standardized Luminosity of the Tip of the Red Giant Branch Utilizing Multiple Fields in NGC 4258 and the CATs Algorithm**

*Li, S., Riess, A. G., Scolnic, D., Anand, G. S., Wu, J., Casertano, S., Yuan, W., Beaton, R., & Anderson, R. I., 2023, [ApJ](#)*

### **CATS: The Hubble Constant from Standardized TRGB and Type Ia Supernovae**

*Scolnic, D., Riess, A. G., Wu, J., Li, S., Anand, G. S., Beaton, R., Casertano, S., Anderson, R., Dhawan, S., Ke, X., 2023, [ApJ](#)*

### **Comparative Analysis of TRGBs (CATs) from Unsupervised, Multi-Halo-Field Measurements: Contrast is Key**

*Wu, J., Scolnic, D., Riess, A. G., Anand, G. S., Beaton, R., Casertano, S., Ke, X., & Li, S., 2023, [ApJ](#)*

### **A Possible Dwarf Galaxy Satellite-of-Satellite Problem in $\Lambda$ CDM**

*Müller, O., Heesters, N., Jerjen, H., Anand, G. S., & Revaz, Y., 2023, [A&A](#)*

### **Serendipitous Nebular-phase JWST Imaging of SN Ia 2021aefx: Testing the Confinement of 56-Co Decay Energy**

*Mayker Chen, N., Tucker, M., Hoyer, N., [5 authors], Anand, G. S., [19 authors], 2023, [ApJL](#)*

**A Nearby Isolated Dwarf: Star Formation and Structure of ESO 006-001**

Makarova, L. N., Tully, R. B., *Anand, G. S.*, Lambert, T. S., Sharina, M. E., Koribalski, B. S., & Kraan-Korteweg, R. C., 2023, [ApJ](#)

**The PHANGS-JWST Treasury Survey: Star Formation, Feedback, and Dust Physics at High Angular resolution in Nearby Galaxies**

Lee, J. C., Sandstrom, K. M., Leroy, A. K., Thilker, D. A., Schinnerer, E., [6 authors], *Anand, G. S.*, [65 authors], 2023, [ApJL](#)

**PHANGS-JWST First Results: The Dust Filament Network of NGC 628 and its Relation to Star Formation Activity**

Thilker, D. A., Lee, J. C., Deger, S., [24 authors], *Anand, G. S.*, [11 authors], 2023, [ApJL](#)

**PHANGS-JWST First Results: Stellar Feedback-Driven Excitation and Dissociation of Molecular Gas in the Starburst Ring of NGC 1365?**

Liu, D., Schinnerer, E., Cao, Y., Leroy, A., [24 authors], *Anand, G. S.*, [12 authors], 2023, [ApJL](#)

**PHANGS-JWST First Results: A statistical view on bubble evolution in NGC628**

Watkins, E. J., Barnes, A., [11 authors], *Anand, G. S.*, [38 authors], 2022, [ApJL](#)

**PHANGS-JWST First Results: Dust Embedded Star Clusters in NGC 7496 Selected via 3.3  $\mu\text{m}$  PAH Emission**

Rodriguez, J., Lee, J., Whitmore, B., Thilker, D., [11 authors], *Anand, G. S.*, [25 authors], 2023, [ApJL](#)

**Peekaboo: The Extremely Metal Poor Dwarf Galaxy HIPASS J1131-31**

Karachentsev, I. D., Makarova, L. N., Koribalski, B. S., *Anand, G. S.*, Tully, R. B., & Kniazev, A. Y., 2023, [MNRAS](#)

**The Whisper of a Whimper of a Bang: 2400 Days of the Type Ia SN 2011fe Reveals the Decay of  $^{55}\text{Fe}$**

Tucker, M. A., Shappee, B. J., Kochanek, C.S., Stanek, K.Z., Ashall, C., *Anand, G. S.*, & Garnavich, P., 2022, [MNRAS](#)

**Cosmicflows-4**

Tully, R. B., Kourkchi, E., Courtois, H. M., *Anand, G. S.*, [13 authors], 2022, [ApJ](#)

**PHANGS: Constraining Star Formation Timescales Using the Spatial Correlations of Star Clusters and Giant Molecular Clouds**

Turner, Jordan A., Dale, Daniel A., Lilly, James, [4 authors], *Anand, G. S.*, [17 authors], 2022, [MNRAS](#)

**A Comprehensive Measurement of the Local Value of the Hubble Constant with 1 km/s/Mpc Uncertainty from the Hubble Space Telescope and the SH0ES Team**

Riess, A. G., Yuan, W., Macri, L. M., [5 authors], *Anand, G. S.*, [9 authors], 2022, [ApJL](#)

**Around the Spindle Galaxy: The Dark Halo Mass of NGC 3115**

Karachentsev, I. D., Makarova, L. N., *Anand, G. S.*, & Tully, R. B., 2022, [AJ](#)

**PNLF Distances for 19 Galaxies Observed by PHANGS-MUSE**

Scheuermann, F., Kreckel, K. *Anand, G. S.*, [3 authors], Van Dyk, S. D., [11 authors], 2022, [A&A](#)

**The PHANGS-MUSE survey. Probing the chemo-dynamical evolution of disc galaxies**

Emsellem, E., Schinnerer, E., Santoro, F., [18 authors], *Anand, G. S.*, [26 authors], 2022, [A&A](#)

**KK 242, A Faint Companion to the Isolated Scd Galaxy NGC 6503**

Karachentsev, I. D., Cannon, J. M., Fuson, J., Inoue, J. L., Tully, R. B., *Anand, G. S.*, & Kaisin, S. S., 2022, [AJ](#)

**Late-Onset Circumstellar Medium Interactions are Rare: An Unbiased GALEX View of Type Ia Supernovae**

Dubay, L., Tucker, M., Do, A., Shappee, B., *Anand, G. S.*, 2022, [ApJ](#)

**The PHANGS-HST Survey: Physics at High Angular resolution in Nearby Galaxies with the Hubble Space Telescope**

Lee, Janice C., Whitmore, Bradley C., Thilker, David A., Deger, Sinan, Larson, Kirsten L., Ubeda, Leonardo, *Anand, G. S.*, [10 authors], White, R. L., [36 authors], 2022, [ApJS](#)

**Measuring an off-Center Detonation through Infrared Line Profiles: The peculiar Type Ia Supernova SN 2020qxp/ASASSN-20jq**

Hoefflich, P., Ashall, C., Bose, S., [4 authors], *Anand, G. S.*, [12 authors], 2021, [ApJ](#)

**PHANGS–ALMA: Arcsecond CO(2–1) Imaging of Nearby Star-Forming Galaxies**

Leroy, A., Schinnerer, E., Hughes, A., [16 authors], *Anand, G. S.*, [52 authors], 2021, [ApJS](#)

**SN2019yvv Does Not Conform to SN Ia Explosion Models**

Tucker, M. A., Ashall, C., Shappee, B. J., Valley, P. J., Kochanek, C. S., Huber, M. E., *Anand, G. S.*, Keane, J. V., Hsiao, E. Y., Holm, T. W. S., 2021, [ApJ](#)

**PHANGS-ALMA Data Processing and Pipeline**

Leroy, A., Hughes, A., Liu, D., [16 authors], *Anand, G. S.*, [47 authors], 2021, [ApJS](#)

**The Cepheid Distance to the Narrow-Line Seyfert 1 Galaxy NGC 4051**

Yuan, W., Macri, L., Peterson, B. M., Riess, A. G., Fausnaugh, M. M., Hoffman, S. L., *Anand, G. S.*, [11 authors], 2021, [ApJ](#)

**The Distance and Mass of the NGC 253 Galaxy Group**

Karachentsev, I. D., Tully, R. B., *Anand, G. S.*, Rizzi, L., Shaya, E. J., 2021, [AJ](#)

**The Electron-capture Origin of Supernova 2018zd**

Hiramatsu, D., Howell, D. A., Van Dyk, S. D., [19 authors], *Anand, G. S.*, [7 authors], 2021, [Nature Astronomy](#)

**The Properties of Dwarf Spheroidal Galaxies in the Cen A Group: Stellar Populations, Internal Dynamics, and a Heart-Shaped H $\alpha$  Ring?**

Müller, O., Fahrion, K., Rejkuba, M., Hilker, M., Lelli, F., Lutz, K., Pawłowski, M. S., Coccato, L., *Anand, G. S.*, & Jerjen, H., 2020, [A&A](#)

**Distance and Mass of the M104 (Sombrero) Group**

Karachentsev, I. D., Makarova, L. N., Tully, R. B.; *Anand, G. S.*; Rizzi, L., Shaya, E. J., 2020, [A&A](#)

**KKH 22, The First Dwarf Spheroidal Satellite of IC 342**

Karachentsev, I. D., Makarova, L. N., Tully, R. B.; *Anand, G. S.*; Rizzi, L., Shaya, E. J., Afanasiev, V. L., 2020, [A&A](#)

**Cosmicflows-4: The Calibration of Optical and Infrared Tully-Fisher Relations**

Kourkchi, E.; Tully, R. B., *Anand, G. S.*, Courtois, H. M., Dupuy, A., Neill, J. D., Rizzi, L., Seibert, M., 2020, [ApJ](#)



**Does Gravity Fall Down? Evidence for Gravitational-wave Deflection along the Line of Sight to GW170817**

Rubin, D., Szapudi, I., Shappee, B. J., *Anand, G. S.*, 2020, [\*ApJL\*](#)

**The High-Redshift Clusters Occupied by Bent Radio AGN (COBRA) Survey**

Paterno-Mahler, R., Blanton, E. L., Ashby, M. L. N., Brodwin, M., Wing, J. D., Decker, B., Golden-Marx, E., & *Anand, G. S.*, 2017, [\*ApJ\*](#)

**INVITED TALKS**

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**Cosmicflows-4: Tip of the Red Giant Branch Distances**

American Museum of Natural History, New York, NY- September 2021

Herzberg Astronomy and Astrophysics Research Centre, NRC Canada- April 2021

UMass Amherst Galaxy Lunch Talk, Amherst, MA- March 2021

**PHANGS-HST: New Tip of the Red Giant Branch Distances**

IPAC Colloquium, Pasadena, CA- July 2020

**CONTRIBUTED TALKS**

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**Tip of the Red Giant Branch Distances to Nearby Galaxies**

Caltech Tea Talk- June 2020

Visiting Scholars Talk, W.M. Keck Observatory- August 2017

**Peculiar Velocities of Galaxies Just Beyond the Local Group**

Constrained Local Universe Simulations 2019 Meeting, University of Lyon- September 2019

**Exploring the Structural Evolution of Massive Quiescent Galaxies**

Keck Northeast Astronomy Consortium- November 2014

Colby Undergraduate Summer Research Retreat- July 2014

**Observations and Analysis of Orbital Period Changes in Contact Binaries**

Keck Northeast Astronomy Consortium- October 2013

**CONFERENCE POSTERS**

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**PHANGS-HST: New Tip of the Red Giant Branch Distances**

236th Meeting of the American Astronomical Society- June 2020

**The Extragalactic Distance Database: Color-Magnitude Diagrams and Tip of the Red Giant Branch Distances**

235th Meeting of the American Astronomical Society- January 2020

**Tip of the Red Giant Branch Distances to Nearby Galaxies**

Stars: Birth and Death, GMT Community Science Meeting- September 2018

The 21st Century HR Diagram, Space Telescope Science Institute- April 2018

**Chandra Observation of the WAT Radio Source/ICM Interaction in Abell 623**

229th Meeting of the American Astronomical Society- January 2017

Chandra Science for the Next Decade, Harvard-Smithsonian Center for Astrophysics- August 2016

**Observations and Analysis of Orbital Period Changes in Contact Binaries**

Vassar Undergraduate Research Summer Institute- July 2013