Dr. Steven R. Goldman

Software Engineer II · Space Telescope Science Institute
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Specialization: Evolved stars, dust, long period variables, symbiotic Miras, Magellanic Clouds, dwarf galaxies, Local Group, M31, UV to mid-IR imaging and spectroscopy, radio interferometry, spectral energy distribution (SED) fitting, time-series analysis, image alignment and drizzling.

Research Interests: The impact of evolved stars on their environment and vice-versa. Specifically, the effects of metallicity on the dust production, wind dynamics, mass-loss mechanism, and evolution of Asymptotic Giant Branch (AGB) stars and Red Supergiants (RSGs). This involves studies of statistical samples of nearby AGB populations using primarily the Hubble and Spitzer Space Telescopes.

APPOINTMENTS

Space Telescope Science Institute (STScI) February 2023 - present
Baltimore, MD USA
Position: Science Software Engineer

Haverford College January 2023 - May 2023
Haverford, PA USA
Position: Visiting Assistant Professor

Stratospheric Observatory For Infrared Astronomy (SOFIA) November 2021 - February 2023
Mountain View, CA USA
Position: Observatory & Instrument Scientist

STScI October 2017 - November 2021
Baltimore, MD USA
Position: Postdoctoral Fellow
Supervisor: Martha Boyer

EDUCATION

Keele University October 2013 - December 2017
Staffordshire, United Kingdom
Degree: PhD in Astrophysics
Thesis: The metallicity dependence of maser emission and mass loss from RSG and AGB stars
Advisor: Jacco Th. van Loon

St. Lawrence University September 2009 - July 2013
Canton, NY
Degree: B. S. in Physics

AWARDED PROPOSALS (PRINCIPAL INVESTIGATOR)

2022 Hubble Space Telescope, PID: 17088 ($137 k)	30 primary orbits
2022 SOFIA (first quintile)	18 hours (canceled)
2022 GASKAP-OH (Science team lead: LMC maser populations)	50 hours
2021 Hubble Space Telescope, PID: 16492 ($65 k)	4 primary orbits
2021 SOFIA, PID: 75_0057 ($40 k)	4 hours
2017 Australia Telescope Compact Array Telescope, PID: C2996	92 hours

2017 Very Large Telescope VISIR, PID: 099.D-0907	1 Night
2017 Very Large Telescope VISIR, PID: 098.D-0272	0.5 hours
2016 Very Large Telescope XSHOOTER, PID: 097.D-0605	1.5 hours
2015 Westerbork Synthesis Radio Telescope, PID: R14/010	30 hours
2014 Southern African Large Telescope	5.5 hours
2012 National Science Foundation Summer REU Fellowship	

RECENT AWARDED PROPOSALS (CO-INVESTIGATOR)

James Webb Space Telescope (3 programs)	72 primary / 2 parallel hours
Hubble Space Telescope (9 programs)	120 primary / 535 parallel orbits
SOFIA (2 programs)	20.25 hours
SOFIA Legacy (cut short by cancellation)	100 hours → 4 hours
ACA (NESS)	750 hours
Astrophysics Data Analysis Program (18-ADAP18-142)	$335 k
ALMA	5 hours

SELECTED SEMINAR & CONFERENCE PRESENTATIONS

2024 Talk, AAS Winter Meeting	New Orleans, USA
2022 Invited Speaker, IAU General Assembly	Busan, South Korea
2022 Featured Speaker, AstroPhilly22	Villanova University, USA
2022 Invited Colloquium	University of Auckland, New Zealand
2022 Invited Colloquium	University of Canterbury, New Zealand
2022 Invited Talk, AAS Summer Meeting	Pasadena, USA
2022 Invited Colloquium	NRC Herzberg, Canada
2021 Invited Panelist, Evolved Stars and their Circumstellar Environments	Global (Remote)
2021 Invited Talk, GAPS: unsolved problems in red Giants And suPergiantS	Global (Remote)
2021 Talk, DELVE: The Death-Throes of Evolved Stars	Global (Remote)
2021 Invited Talk	St. Lawrence University, USA
2020 Invited Talk	STScI, USA
2019 Invited Colloquium	RIT, USA
2019 Invited Colloquium	EAO Hawaii, USA
2019 Talk, A Star Has Evolved: A Conference in the Honor of Hans Olofsson	Smögen, Sweden
2019 Talk, HotSci	STScI, USA
2018 Talk, Cosmic Dust: origin, applications & implications	Copenhagen, Denmark
2018 Talk, European Week in Astronomy and Space Science	Liverpool, UK
2016 Talk, Blowing in the wind (Awarded Best Talk)	ICISE, Vietnam
2016 Talk, Postgraduate Research Symposium (Awarded Best Talk)	Keele University, UK
2016 Talk, SKA Delivering the Science	Cambridge University, UK
2015 Talk, UK SKA Science Meeting	Manchester University, UK
2015 Invited Colloquium,	Kagoshima University, Japan

TEACHING

Haverford College, USA

Astro 101, Visiting Assistant Professor	Spring, 2023

Keele University, UK

Electronics, Demonstrator/Lab Assistant	2014 - 2016
Programming I, Demonstrator/Lab Assistant	2015

STUDENTS MENTORED

Tessa Pearlstein — Haverford College, Summer 2023
Dust Injection Rate of TP-AGB stars in the M33 galaxy

Sean Garner — SOFIA/USRA, Summer 2022
SOFIA/EXES Water Line Analysis of the Symbiotic Mira HM Sge

Nathan Wolthuis — SOFIA/USRA, Summer 2022
*HST/WFC3 Image Analysis of Nebular N*II *emission of HM Sge*

OBSERVING EXPERIENCE

SOFIA	3 flights
James Clerk Maxwell Telescope	70 hours
Very Large Telescope	1 night
Australia Telescope Compact Array	92 hours
Parkes Radio Telescope	36 hours
Arecibo L-band (ALFALFA)	20 hours

SOFTWARE DEVELOPMENT

Observatory Service

- *Drizzlepac*: Primary maintainer for the widely-used image re-alignment software also used for the alignment, drizzling, and catalog creation for the Hubble Advanced Products.
- *SOFIA Data-Analysis Cookbooks and FAQs*: Jupyter notebooks demonstrating a variety of techniques for analyzing infrared data from SOFIA, as well as detailed explanations FAQs of common misconceptions.

Research

- The *DESK*: Independently led the development and publication of the first open-source python package to fit the SEDs of evolved stars with models to get meaningful intrinsic properties.
- The *BEAST*: Improved on testing and functionality of a large-scale open-source astropy-affiliated python package that fits stellar populations' SEDs to determine ISM, dust, and stellar properties using Bayesian statistics, dust models, and stellar evolutionary models.

COMMUNITY OUTREACH

Public Outreach Talks, 2018 – Present, (USA, Canada, & Mexico)
- NASA's *Universe of Learning*, *Skype-a-Scientist*, *Astronomy On Tap*, Independently organized

Earth and Space Observatory volunteer, 2013 – 2017, (Keele University, UK)

ACADEMIC SERVICE

Organized the SOFIA New Zealand Lecture Series	July 2022
SOFIA School Co-Chair	February 2022
STScI postdoctoral representative	2020 - 2022
DELVE conference SOC	February 2021
Low-Density Universe Lunch Organizer	2018 - 2019
TAC Panel Support: Hubble & SOFIA	
Referee: Astrophysical Journal; Astronomy & Astrophysics	
Panelist: NASA	

SELECTED PRESS

NASA press release, *NASA's Hubble Finds Surprises Around a Star That Erupted 40 Years* (Link)
Phys.org, *Research investigates evolution of symbiotic binary HM Sagittae* (Link)
Sky at Night magazine interview about SOFIA New Zealand deployment (Link)
NASA press release, *SOFIA Watches a Binary Star System's Eclipse* (Link)

REFEREED PUBLICATIONS

Links: ADS, ORCID, Google Scholar

First-Authored Peer-Reviewed Publications:

Citations source: NASA ADS

1. Goldman S. R. et al., 2024, ApJ, 961, 14
   A Multi-Wavelength Study of the Symbiotic Mira HM Sge with SOFIA & HST
2. Goldman S. R. et al., 2022, ApJS, 259, 41 citations: 6
   A Census of Thermally-Pulsing AGB stars in the Andromeda Galaxy and a First Estimate of their Contribution to the Global Dust Budget
3. Goldman S. R., 2020, JOSS, 5(54), 2554 citations: 7
   The Dusty Evolved Star Kit (DESK): A Python package for fitting the Spectral Energy Distribution of Evolved Stars. Journal of Open Source Software
4. Goldman S. R. et al., 2019, ApJ, 884, 152 citations: 7
   AGB Stars in the Nearby Galaxy: Leo P
5. Goldman S. R. et al., 2019, ApJ, 877, 49 citations: 33
   An Infrared Census Of Dust In Nearby Galaxies With Spitzer (DUSTiNGS): V. The Period-luminosity Relation For Dusty Metal-poor AGB Stars
6. Goldman S. R. et al., 2018, MNRAS, 473, 3835 citations: 15
   A dearth of OH/IR stars in the Small Magellanic Cloud
7. Goldman S. R. et al., 2017, MNRAS, 465, 403 citations: 126
   The wind speeds, dust content, and mass-loss rates of evolved AGB and RSG stars at varying metallicity

Co-Authored Peer-Reviewed Publications:

8. Cohen et al. 2024a, accepted in ApJ
   Scylla II. The Spatially Resolved Star Formation History of the Large Magellanic Cloud Reveals an Inverted Radial Age Gradient
9. Murray et al. 2024, accepted in ApJS
   Scylla I: A pure-parallel, multi-wavelength imaging survey of the ULLYSES fields in the LMC and SMC
10. Karnath et al. 2024, accepted in ApJ
    An Analysis of the Complex and Compact Outflow Cavity Carved by HOPS 361-A in NGC 2071 IR
11. Gull et al. 2022, ApJ, 941, 206
    A Panchromatic Study of Massive Stars in the Extremely Metal-Poor Local Group Dwarf Galaxy Leo A

12. Ingallinera et al. 2022, MNRAS, 512, 21
Evolutionary map of the Universe (EMU): 18-cm OH-maser discovery in ASKAP continuum images of the SCORPIO field

13. Sankrit et al. 2022, ApJ, 926, 177
SOFIA/FORCAST Monitoring of the Dust Emission from R Aqr: Start of the Eclipse

14. Scicluna et al. 2022, MNRAS, 512, 1091
The Nearby Evolved Stars Survey II: Constructing a volume-limited sample and first results from the James Clerk Maxwell Telescope

15. Jones et al., 2021, MNRAS, 504, 565
Infrared variable stars in the compact elliptical galaxy M32

16. Girardi et al., 2020, ApJ, 901, 19
PHAT XX. AGB stars and other cool giants in M31 star clusters

17. Nanni A. et al., 2019, MNRAS, 487, 502
The mass-loss, expansion velocities and dust production rates of carbon stars in the Magellanic Clouds

18. Dharmawardena T. E. et al., 2019, MNRAS, 489, 3218
The Nearby Evolved Stars Survey: I. JCMT/SCUBA-2 Sub-millimetre detection of the detached shell of U Antliae

19. Karambelkar V. R. et al., 2019, ApJ, 877, 110
SPIRITS Catalog of Infrared Variables: Identification of Extremely Luminous Long Period Variables

20. Orosz G. et al., 2017, AJ, 153, 1190
Astrometry of OH/IR stars using 1612 MHz hydroxyl masers. I. Annual parallaxes of WX Psc and OH138.0+7.2

21. Groenewegen M. A. T. et al., 2016, A&A, 596, A50
The ALMA detection of CO rotational line emission in AGB stars in the Large Magellanic Cloud

22. McDonald I. et al., 2015, MNRAS, 453, 4324
ALMA reveals sunburn: CO dissociation around AGB stars in the globular cluster 47 Tucanae

Other Publications:

23. Goldman et al. 2022, Research Notes of the AAS, 6, 159
Sudden Dimming of the Symbiotic Mira HM Sge

24. Goldman et al. 2022, AAS Meeting, 240 proceedings, 426.04
A Census of Thermally-Pulsing AGB stars in the Andromeda Galaxy and a First Estimate of their Contribution to the Global Dust Budget

25. Sloan et al. 2021, AAS Meeting, 237 proceedings, 541.16
Spitzer's Last Look at the Small Magellanic Cloud.

26. Scicluna et al. 2020, arXiv:2002.03100 (Decadal white paper)
Studies of Evolved Stars in the Next Decade: EAO Submillimetre Futures White Paper Series

27. Karambelkar et al. 2020, , AAS Meeting, 235 proceedings, 335.04
SPIRITS catalog of infrared variables : Identification of extremely luminous long period variables

28. Goldman S. R. and Boyer M. L., 2019, IAU Meeting 343 proceedings, 14(S343), 406-408
    Infrared light curves of dusty & metal-poor AGB stars
29. Goldman S. R. and Boyer M. L., 2019, AAS Meeting 233 proceedings, 33.06
    Infrared light curves of dusty & metal-poor AGB stars