Tea Temim

Personal Data

Position:	Research Astronomer
Institution:	Princeton University
	Department of Astrophysical Sciences
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Research Interests

- Supernova explosions
- Supernova remnants and pulsar wind nebulae
- Dust production and processing by supernovae
- Evolution of dust in galaxies
- Interstellar Medium

Employment

2021 - present	Princeton University, Department of Astrophysical Sciences Position: Research Astronomer
2016 - 2021	Space Telescope Science Institute Position: STScI Scientist for the James Webb Space Telescope
2014 - 2016	NASA Goddard Space Flight Center, University of Maryland College Park Position: Research Associate
2010 - 2013	NASA Goddard Space Flight Center Position: NASA Postdoctoral Fellow
2009 - 2010	Harvard-Smithsonian Center for Astrophysics Position: Postdoctoral Researcher
2007 - 2009	Harvard-Smithsonian Center for Astrophysics Position: Predoctoral Fellow Advisor: Dr. Patrick Slane
2003 - 2007	University of Minnesota, Department of Astronomy Position: Graduate Research Assistant Advisor: Profs. Robert D. Gehrz and Charles E. Woodward
2002 - 2004	University of Minnesota, Department of Astronomy Position: Teaching Assistant, Astronomy 1001 Exploring the Universe Supervisor: Prof. John Dickey

Education

2009	Ph.D. Astrophysics, University of Minnesota Thesis: Multi-wavelength Study of Pulsar Wind Nebulae and Supernova Remnants Advisors: Dr. Patrick Slane (Harvard-Smithsonian CfA), Prof. Robert D. Gehrz, Prof. Charles E. Woodward
2006	M.S. Astrophysics, University of Minnesota Thesis: Spitzer Infrared Imaging and Spectroscopy of Supernova Remnants Advisors: Prof. Robert D. Gehrz and Prof. Charles E. Woodward
2003	B.S. Physics, University of Minnesota, Institute of Technology
2003	B.S. Astrophysics, University of Minnesota, Institute of Technology

Recently Awarded Proposals

2021 Temim et al., James Webb Space Telescope, Cycle 1 (PI)
The Origin of the Crab Nebula

2021 Milisavljevic et al., James Webb Space Telescope, Cycle 1 (co-I)
JWST Survey of the Prototypical Core-collapse Supernova Remnant Cassiopeia A

2021 Foley et al., James Webb Space Telescope, Cycle 1 (co-I)
Nucleosynthesis, Astrophysics, and Cosmology with IR Observations of a Gravitational Wave Counterpart

2021 Drout et al., James Webb Space Telescope, Cycle 1 (co-I)
Detecting the Synthesis of the Heaviest Elements with Photometry of a Kilonova in the Optically Thin Phase

2021 Jha et al., James Webb Space Telescope, Cycle 1 (co-I)
See Through Supernovae: Nebular Spectroscopy of Exploding White Dwarfs

2021 Kilpatrick et al., James Webb Space Telescope, Cycle 1 (co-I)
Nebular Spectroscopy of a Kilonova with JWST

2021 Fox et al, James Webb Space Telescope, Cycle 1 (co-I)
Disentangling the Origin of Dust in Type IIn Supernovae

2021 Matsuura et al., James Webb Space Telescope, Cycle 1 (co-I)
Shocks and expanding ejecta in Supernova 1987A

2017 Castro et al., NASA Fermi Guest Investigator, Cycle 10 (co-I)
Characterizing the Gamma-ray Emission from Pulsar Wind Nebulae with Fermi-LAT ($57.0k)

2016 Temim et al., XMM-Newton AO-16 (PI)
Understanding the Evolution of Composite SNRs: An XMM Study of MSH 15-56, 350 ks ($80.3k)

2016 Temim et al., NuSTAR Cycle 2 (PI)
Spectral Evolution of Crushed Pulsar Wind Nebulae, 75 ks ($41.1k)

2016 Gelfand et al.,NuSTAR Cycle 2 (co-I)
The Initial Spin Period of PSR J1930+1852 in PWN G54.1+0.3, 80 ks

2016 Borkowski, Reynolds & Temim, SOFIA (co-I)
tProbing Supernova Ejecta Dust with Stellar Lightbulbs: MID- IR Imaging of G54.1+0.3

2015 Temim et al., Chandra X-ray Observatory proposal (PI)
Chandra Observation of the Composite SNR MSH 15-56, 175 ks ($66.9k)

2015 Slane et al., Chandra X-ray Observatory theory proposal (co-I)
Modeling the Structure of Composite Supernova Remnants

2015 Temim et al., Suzaku X-ray Satellite, Cycle 10 proposal (PI)
A Suzaku Observation of the MSH 15-56 Shell, 150 ks

2015 Laming et al., NASA Astrophysics Data Analysis Program (ADAP) proposal
The Inner Ejecta and the Infrared Spectrum of Cassiopeia A ($420.4k)

2014 Dwek & Temim, NASA Astrophysics Data Analysis Program (ADAP) proposal
Supernova Remnants as Laboratories for Determining the Properties of Ejecta Dust and Processing of Dust Grain in Shocks ($367.1k)

2013 Dwek et al., NASA Astrophysics Data Analysis Program (ADAP) proposal (Co-I)
The Origin and Evolution of Dust in the Large Magellanic Cloud

2012 Romani et al., Very Large Chandra X-ray Observatory proposal (Co-I)
A Legacy Study of the Relativistic Shocks of PWNe, 1300 ks

2012 Slane et al., Large Chandra X-ray Observatory proposal (Co-I)
A Deep Chandra Observations of MSH 11-62, 375 ks

2011 Temim et al., Herschel Space Observatory proposal (PI)
PACS Observations of Supernova Ejecta and Dust in the Composite Supernova Remnant Kes 75, 10.3 hr

2010 Temim et al., Herschel Space Observatory proposal (PI)
Imaging and Spectroscopy of the Infrared Shell Surrounding the Pulsar Wind Nebula G54.1+0.3

Invited Talks & Colloquia

Dec 2020	What Supernova Remnants Reveal about Stellar Explosions and their Progenitors Brown Bag Seminar, New York University
Dec 2020	The James Webb Space Telescope: Science Goals and Capabilities Purdue University
June 2019	Evolution of Pulsar Wind Nebulae Inside Supernova Remnants XMM Workshop: Astrophysics of Plasmas, Madrid, Spain
June 2019	Supernovae as Drivers of Dust Evolution National Observatory of Athens, Astronomy Colloquium
June 2019	Progenitor Properties of Composite Supernova Remnants Supernova Remnants: An Odyssey in Space After Stellar Death, Chania, Crete
May 2019	Progenitors and Explosion Properties of Core-collapse Supernova Remnants Fifty-One Erg International Workshop, North Carolina State University
Mar 2019	Probing the Properties of Supernova-formed Dust through Observations of Young PWNe Carnegie DTM, Astronomy Colloquium, Washington, DC
Oct 2018	Supernova Science with JWST Astrophysics Seminar, Florida State University
Oct 2018	Evolution of Pulsar Wind Nebulae Inside Supernova Remnants Astrophysics Seminar, Purdue University
Apr 2018	Type Ia Supernovae in the mid-IR & JWST New advances in NIR Type Ia Supernova Science, University of Pittsburgh
Mar 2017	Supernova Dust and Ejecta Around Pulsar Wind Nebulae SOFIA Community Tele-Talk Series
Jan 2017	Transient Science with JWST in the mid-IR The Transient Universe with JWST Workshop, Harvard-Smithsonian CfA
Dec 2016	Supernova Remnants, Pulsar Winds, and their Interaction with the ISM Penn State Astrophysics Colloquium
Oct 2016	Supernovae as Drivers of Dust Evolution in Galaxies The Ohio State University CCAPP Seminar
Aug 2016	Supernovae as Drivers of Dust Evolution in Galaxies The University of Vermont Physics Colloquium
June 2016	Optical and Infrared Observations of Pulsar Wind Nebulae Workshop on Modeling Pulsar Wind Nebulae, Barcelona, Spain
June 2016	Evolution of Pulsar Wind Nebulae Inside Supernova Remnants Supernova Remnants: An Odyssey in Space After Stellar Death, Chania, Greece
Mar 2016	Supernova Remnants, Pulsar Winds, and their Impact on the ISM University of Wisconsin – Madison, Department of Astronomy Colloquium
Oct 2015	Feedback from Supernova Remnants Feedback in the Magellanic Clouds Workshop, STScI
May 2015	Evolution of Composite Supernova Remnants Princeton University Department of Astrophysical Sciences Seminar
Apr 2015	Supernovae as Drivers of Dust Evolution in Galaxies Rutgers University Astronomy Group Seminar
Apr 2015	Supernovae as Drivers of Dust Evolution in Galaxies Clemson University Department of Physics & Astronomy Colloquium
Mar 2015	Supernovae as Drivers of Dust Evolution in Galaxies University of Michigan Department of Astronomy Colloquium
Mar 2015	Supernovae as Drivers of Dust Evolution in Galaxies New York University (NYU) Astrophysics Seminar
Dec 2014	Supernovae as Drivers of Dust Evolution in Galaxies New York University (NYU), Abu Dhabi, Astrophysics Seminar

Sep 2014	Supernovae as Drivers of Dust Evolution in Galaxies United States Naval Observatory Colloquium, Washington, DC
Dec 2013	Dust Emission in Supernova Remnants NASA Goddard Space Flight Center, Division Director's Seminar
Nov 2013	Supernova Dust and Ejecta Illuminated by Pulsar Wind Nebulae George Washington University Astronomy Seminar
Jul 2013	Supernova Ejecta and Dust Illuminated by Pulsar Wind Nebulae University of California at Berkeley Astronomy Department Seminar
Jul 2013	Supernova Ejecta and Dust Illuminated by Pulsar Wind Nebulae Los Alamos National Laboratory, Los Alamos, NM
May 2012	Freshly-formed Supernova Dust Illuminated by Pulsar Wind Nebulae Space Telescope Science Institute, CSM/ISM Journal Club
Feb 2011	Freshly-formed Supernova Dust Illuminated by Pulsar Wind Nebulae NASA Goddard Space Flight Center Astrophysics Division Seminar
May 2010	Multi-wavelength Observations of Composite Supernova Remnants NASA Goddard Space Flight Center SEAL Seminar
May 2007	Infrared Observations of Supernova Remnants: Spitzer and Beyond Endpoints and Interactions: A Workshop On the Future of Supernova Remnant Research, Honolulu, HI

Publications in Refereed Journals

32. Element Abundances in the Unshocked Ejecta of Cassiopeia A
Laming, J. M. & Temim, T., 2020ApJ, 2020, ApJ, 904, 115L

31. The Nonstandard Properties of a Standard PWN: Unveiling the Mysteries of PWN G21.5-0.9 Using Its IR and X-Ray Emission
Hattori, S.; Zhang, E.; Straal, S. M.; Temim, T.; Gelfand, J.; Slane, P., 2020, ApJ, 904, 32H

30. Turbulent Model of Crab Nebula Radiation
Luo, Yonggang; Lyutikov, Maxim; Temim, Tea; Comisso, Luca, 2020, ApJ, 896, 147

29. Interpreting Crab Nebula's Synchrotron Spectrum: Two Acceleration Mechanisms
Lyutikov, M., Temim, T.,; Komissarov, S., Slane, P., Sironi, L., Comisso, L., 2019, MNRAS, 2051

28. Probing the Innermost Ejecta Layers in Supernova Remnant Kes 75: Implications for the Supernova Progenitor
Temim, T., Slane, P., Sukhbold, T., Koo, B.-C., Raymond, J. C., Gelfand, J. D., 2019, ApJL, 878L, 19

27. Investigating the Structure of Vela X
Slane, P., Lovchinsky, I., Kolb, C., Snowden, S. L., Temim, T., et al., Blondin, J., 2018, ApJ, 865, 86

26. ALMA observations of supernova remnant N49 in the LMC: I. Discovery of CO clumps associated with X-ray and radio continuum shells
Yamane, Y., et al., 2018, ApJ, 863, 1

25. A Deep X-ray View of the Synchrotron-Dominated Supernova Remnant G330.2+1.0
Williams, B. J., Hewitt, J. W., Petre, R., Temim, T., 2018, ApJ, 855, 118

24. Proper Motion of the High-Velocity Pulsar in SNR MSH 15-56
Temim, T., Slane, P., Plucinsky, P., Gelfand, J., Castro, D., and Kolb. C., 2017, ApJ, 851, 128

23. Comparing Neutron Star Kicks to Supernova Remnant Asymmetries
Holland-Ashford, T., Lopez, L. A., Auchettl, K., Temim, T., Ramirez-Ruiz, E., 2017, ApJ, 844, 84

22. Evolution of a Pulsar Wind Nebula within a Composite Supernova Remnant
Kolb, C.; Blondin, J.; Slane, P.; Temim, T., 2017 ApJ, 844, 1

21. A Massive Shell of Supernova-formed Dust in SNR G54.1+0.3
Temim, T., Dwek, E., Arendt, R. G., Borkowski, K., Reynolds, S. P., Slane, P., Gelfand, J., Raymond, J. C., 2017, ApJ, 836, 129

20. Deep Chandra Observations of the Pulsar Wind Nebula Created by PSR B0355+54
Klingler, N., et al., 2016, ApJ, 833, 253

19. Radio Polarization Observations of the Snail: A Crushed Pulsar Wind Nebula in G327.1-1.1 with a Highly Ordered Magnetic Field
Ma, Y. K., Ng, C.-Y., Bucciantini, N., Slane, P. O., Gaensler, B. M., Temim, T., 2016
ApJ, 820, 100

18. Late-time Evolution of Composite Supernova Remnants: Deep Chandra Observations and Hydrodynamical Modeling of a Crushed Pulsar Wind Nebula in SNR G327.1-1.1
Temim, T., Slane, P., Kolb, C., Blondin, J., Hughes, J. P., Bucciantini, N., 2015,
ApJ, 808, 100

17. The Properties of the Progenitor Supernova, Pulsar Wind, and Neutron Star inside PWN G54.1+0.3
Gelfand, J. D., Slane, P., Temim, T., 2015, ApJ, 807, 30

16. Dust Destruction Rates and Lifetimes in the Magellanic Clouds
Temim, T., Dwek, E., Tchernyshyov, K., Boyer, M. L.,Meixner, M., Gall, C., Roman-Duval, J., 2015, ApJ, 799, 158

15. X-ray Analysis of the Proper Motion and Pulsar Wind Nebula for PSR J1741-2054
Auchettl, K., Slane, P., Romani, R. W., Posselt, B., Pavlov, G. G., Kargaltsev, O., Ng, C. Y., Temim, T., Weisskopf, M. C., Bykov, A., Swartz, D. A., 2015, ApJ, 802, 68

14. The Influence of Supernova Remnants on the Interstellar Medium in the Large Magellanic Cloud Seen at 20-600 μm Wavelengths
Lakicevic, M., van Loon, J. Th., Meixner, M., Gordon, K., Bot, C., Roman-Duval, J., Babler, B., Bolatto, A., Engelbracht, C., Filipovic, M., Hony, S., Indebetouw, R., Misselt, K., Montiel, E., Okumura, K., Panuzzo, P., Patat, F., Sauvage, M., Seale, J., Sonneborn, G., Temim, T., Urosevic, D., Zanardo, G., 2015, ApJ, 799, 50

13. The Properties of the Progenitor, Neutron Star, and Pulsar Wind in the SNR Kes 75
Gelfand, J. D., Slane, P., Temim, T., 2014, AN, 335, 318

12. Supernova Remnant Kes 17: Efficient Cosmic Ray Accelerator inside a Molecular Cloud
Gelfand, J. D., Castro, D., Slane, P. O., Temim, T., Hughes, J. P., Rakowski, C., 2013, ApJ, 777. 148

11. The Importance of Physical Models for Deriving Dust Masses in Supernova Ejecta: Radiatively Heated Dust in the Crab Nebula
Temim, T. & Dwek, E., 2013, ApJ, 774, 8

10. High-Energy Emission From the Composite Supernova Remnant MSH 15–56
Temim, T., Slane, P., Plucinsky, P., Gelfand, J., Castro, D., Dickel, J. R., 2013, ApJ, 768, 61

9. Properties and Spatial Distribution of Dust Emission in the Crab Nebula
Temim, T., Sonneborn, G., Dwek, E., Arendt, R. G., Gehrz, R. D., Slane, P., Roellig, T. L., 2012,

ApJ, 753, 72

8. Infrared and X-Ray Spectroscopy of the Kes 75 Supernova Remnant Shell: Characterizing the Dust and Gas Properties
Temim, T., Slane, P., Arendt, R. G., Dwek, E., 2012, ApJ, 745, 46

7. A Broadband Study of the Emission from the Composite SNR MSH 11-62
Slane, P., Hughes, J. P., Temim, T., Rousseau, R., Castro, D., Foight, D., Gaensler, B. M., Funk, S., Lemoine-Goumard, M., Gelfand, J. D., Moffett, D. A., Dodson, R. G., Bernstein, J. P., 2012, ApJ, 749 131

6. Suzaku Detection of Diffuse Hard X-Ray Emission outside Vela X
Katsuda, S., Mori, K., Petre, R., Yamaguchi, H., Tsunemi, H., Bocchino, F., Bamba, A., Miceli, M., Hewitt, J. W., Temim, T.,, Uchida, H., Yoshii, R., 2011, PASJ, Vol.63, No.SP3

5. Deep Chandra Observations of the Crab-like Pulsar Wind Nebula G54.1+0.3 and Spitzer Infrared Spectroscopy of the Associated Shell
Temim, T., Slane, P., Reynolds, S., Raymond, J. C., Borkowski, K., 2010, ApJ, 710, 309

4. Chandra and XMM Observations of the Composite Supernova Remnant G327.1-1.1
Temim, T., Slane, P., Gaensler, B. M., Hughes, J. P., van der Swaluw, E., 2009, ApJ, 691, 895

3. The Early Spectrophotometric Evolution of V1186 Scorpii
Schwarz, G. J., Woodward, C. E., Bode, M. F., Evans, A., Eyres, S. P., Geballe, T. R., Gehrz, R. D., Greenhouse, M. A., Helton, L. A., Liller, W., Lyke, J. E., Lynch, D. K., O'Brien, T. J., Rudy, R. J., Russell, R. W., Shore, S. N., Starrfield, S. G., Temim, T., Truran, J. W., Venturini, C. C., Wagner, R. M., Williams, R. E., Zamanov, R., 2007, AJ, 134, 516

2. Spitzer Space Telescope Infrared Imaging and Spectroscopy of the Crab Nebula
Temim, T., Gehrz, R. D., Woodward, C. E., Roellig, T. L., Smith, N., Rudnick, L., Polomski, E. F., Davidson, K., Yuen, L., Onaka, T. 2006, AJ, 132, 1610

1. The Development of a Steady State, Asymptotic Giant Branch Type, Circumstellar Wind around the Born Again Star FG Sagittae
Gehrz, R. D., Woodward, C. E., Temim, T., Lyke, J. E., Mason, C. G. 2005, ApJ, 623, 1105

Non-Refereed, Review Articles & Chapters

2018 Observing Recommendations for JWST MIRI Users
Garcia Marin, M., et al., 2018, SPIE 10704

2017 Review on Optical and Infrared Observations of Pulsar Wind Nebulae
T. Temim & P. Slane, 2017, Springer Books

2016 Infrared Emission from Supernova Remnants: Formation and Destruction of Dust
B. Williams & T. Temim, 2016, Handbook of Supernovae, Springer Books

2015 The Many Faces of Supernova Remnants
T. Temim, B. Williams, L. Lopez, 2015, Chandra Newsletter Article

2011 Multi-wavelength Observations of Composite Supernova Remnants
T. Temim, High-Energy Emission from Pulsars and their Systems, Astrophysics and Space Science Proceedings, Springer-Verlag Berlin Heidelberg, 2011, p. 393

Recent White Papers

2019 Increasing Gender Diversity and Inclusion in Scientific Committees and Related Activities at STScI
De Rosa, G., Oliveira, C., Pacifici, C., et al. 2019, Bulletin of the American Astronomical Society, Vol. 51, Issue 7

2019 Infrared Stellar Populations: Probing the Beginning and the End
Meixner, M., et al. 2019, Astro2020: Decadal Survey, BAAS, 51, 554

2019 MeV Emission from Pulsar Wind Nebulae: Understanding Extreme Particle Acceleration in Highly Relativistic Outflows
Gelfand, J., et al. 2019, Astro2020: Decadal Survey, BAAS, 51, 513

2019 Supernova Remnants in High Definition
Lopez, L., et al. 2019, Astro2020: Decadal Survey, BAAS, 51, 454

2019 Astromineralogy of Interstellar Dust With X-ray Spectroscopy
Corrales, L., et al. 2019, Astro2020: Decadal Survey, BAAS, 51, 264

2019 Future X-ray Studies of Supernova Remnants
Williams, B., et al. 2019, Astro2020: Decadal Survey, BAAS, 51, 263

2019 Probing the Structure of Interstellar Dust from Micron to Kpc Scales with X-ray Imaging
Valencic, L., et al. 2019, Astro2020: Decadal Survey, BAAS, 51, 24

2019 Probing the Structure of Interstellar Dust from Micron to Kpc Scales with X-ray Imaging
Valencic, L., et al. 2019, Astro2020: Decadal Survey, BAAS, 51, 24