Dr. Brian J. Williams
Curriculum Vitae

Contact Information

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Education

August 2004- May 2010	**Ph.D., Physics** North Carolina State University, Raleigh, NC Minor: Interdisciplinary - Astronomy, Mathematics, Nuclear Physics Dissertation: Supernova Remnants as a Probe of Dust Grains in the ISM Ph.D. Advisors: Dr. Stephen Reynolds and Dr. Kazimierz Borkowski
August 2000 - May 2004	**B.S., Physics** Florida State University, Tallahassee, FL Minor: Mathematics

Research Interests

- Supernova Remnants
- Supernovae
- Pulsar Wind Nebulae
- Dust and the Interstellar Medium

Positions Held

April 2015 – present	Research Scientist, *X-ray Astrophysics Laboratory, NASA Goddard Space Flight Center / Universities Space Research Association, Greenbelt, MD.* I pursue independent astrophysical research related to young supernova remnants and supernovae. Member of the Science Working Group for various X-ray Observatories.
April 2012 – April 2015	NASA Postdoctoral Program Fellow, *NASA Goddard Space Flight Center, Greenbelt, MD.* Conducted astrophysical research on a NASA Fellowship under the advisement of Dr. Robert Petre.
Fall 2010 – March 2012	Postdoctoral Research Associate, *N.C. State University, Raleigh, N.C.* Conducted astrophysical research on supernovae and supernova remnant interactions with the interstellar medium.
Summer 2010, 2011	Physics Instructor, *N.C. State University, Raleigh, N.C.* Developed and taught new course in quantum physics to junior/senior level undergraduate physics majors.
Fall 2010	Adjunct Professor, *Meredith College, Raleigh, N.C.* Taught two sections each of Physics I and Physics I Lab. Responsible for all aspects of course, including design, lecturing, testing, and grading.
Jan. 2005 – May 2010	Graduate Research Assistant, *N.C. State University, Raleigh, N.C.* Conducted astrophysical research relevant to my Ph.D.
Aug. 2004 – May 2005	Graduate Teaching Assistant, *N.C. State University, Raleigh, N.C.* Physics 205 Lab instructor during my first year of graduate school.

Publications

Refereed Journal Articles

These publications may all be viewed in my personal library on ADS, here:

http://tinyurl.com/brianwilliamspapers

- P. Ghavamian, **B.J. Williams**. *The Cold Dust Content of the Oxygen-Rich Supernova Remnant G292.0+1.8.* ApJ, in press.
- Hitomi Collaboration. *The quiescent intracluster medium in the core of the Perseus cluster.* Nature, 535, 117

- **B.J. Williams,** L. Chomiuk, J.W. Hewitt, J.M. Blondin, K.J. Borkowski, P. Ghavamian, R. Petre, S.P. Reynolds. *An X-ray and Radio Study of the Varying Expansion Velocities in Tycho's Supernova Remnant,* 2016, ApJ, 823, 32

- H. Yamaguchi, S. Katsuda, D. Castro, **B.J. Williams,** L.A. Lopez, P.O. Slane, R.K. Smith, R. Petre. *The Precise Shock Velocity of the X-ray Filaments in the RCW 86 Northeast Rim*, 2016, ApJ, 820, 3

- R. Sankrit, J.C. Raymond, W.P. Blair, K.S. Long, **B.J. Williams**, K.J. Borkowski, D.J. Patnaude, S.P. Reynolds. *Second Epoch Hubble Space Telescope Observations of Kepler's Supernova Remnant: The Proper Motions of Balmer Filaments*, 2016, ApJ, 817, 36.

- A. Tran, **B.J. Williams**, R. Petre, S. Ressler, S. P. Reynolds. *Energy Dependence of Synchrotron X-Ray Rims in Tycho's Supernova Remnant*, 2015, ApJ, 812, 101

- **B.J. Williams** & O.D. Fox. *SOFIA Observations of SN 2010jl: Another Non-Detection of the 9.7-micron Silicate Dust Feature*, 2015, ApJL, 808, 22

- **B.J. Williams**, B. Rangelov, O. Kargaltsev, G.G. Pavlov. *Magnesium-rich Ejecta in the SNR G284.3-1.8 Around the High-Mass Gamma-Ray Binary 1FGL J1018.6-5856*, 2015, ApJL, 808, 19

- H. Yamaguchi, C. Badenes, A. Foster, E. Bravo, **B.J. Williams,** K. Maeda, M. Nobukawa, K. Eriksen, N. Brickhouse, R. Petre, K. Koyama. *A Chandrasekhar Mass Progenitor for the Type Ia Supernova Remnant 3C 397*, 2015, *ApJL*, 801, 31

- **B.J. Williams,** K.J. Borkowski, S.P. Reynolds, P. Ghavamian, J.C. Raymond, K.S. Long, W.P. Blair, R. Sankrit, P.F. Winkler, S.P. Hendrick. *Spitzer Observations of the Type Ia Supernova Remnant N103B: Kepler's Older Cousin?* 2014, ApJ, 790, 139

- S.M. Ressler, S. Katsuda, S.P. Reynolds, K.S. Long, R. Petre, **B.J. Williams**, P.F. Winkler. *Magnetic Field Amplification in the Thin X-ray Rims of SN 1006*, 2014, ApJ, 790, 85

- R. Sankrit, J.C. Raymond, M. Batista, T.J. Gaetz, **B.J. Williams**, W.P. Blair, K.J. Borkowski, K.S. Long. *Spitzer IRS Observations of the XA Region in the Cygnus Loop Supernova Remnant*, 2014, ApJ, 787, 3

- P.F. Winkler, **B.J. Williams**, S.P. Reynolds, R. Petre, K.S. Long, S. Katsuda, & U. Hwang. *A High-Resolution X-ray and Optical Study of SN 1006: Asymmetric Expansion and Small-Scale Structure in a Type Ia Supernova Remnant*, 2014, ApJ, 781, 65

- J.C. Raymond, P. Ghavamian, **B.J. Williams**, W.P. Blair, K.J. Borkowski, T.J. Gaetz, R. Sankrit. *Grain Destruction in a Supernova Remnant Shock Wave*, 2013, ApJ, 778, 161

- **B.J. Williams**, K.J. Borkowski, P. Ghavamian, J.W. Hewitt, S.A. Mao, R. Petre, S.P. Reynolds, & J.M. Blondin. *Azimuthal Density Variations Around the Rim of Tycho's Supernova Remnant*, 2013, ApJ, 770, 129

- P.F. Winkler, **B.J. Williams**, W.P. Blair, K.J. Borkowski, P. Ghavamian, K.S. Long, J.C. Raymond,

& S.P. Reynolds. *The First Reported Infrared Emission from the SN1006 Remnant*, 2012, ApJ, 764, 156

- S. Katsuda, K.S. Long, R. Petre, S.P. Reynolds, **B.J. Williams**, & P.F. Winkler. *X-ray Proper Motions and Shock Speeds along the Northwest Rim of SN 1006*, 2012, ApJ, 763, 85

- **B.J. Williams**, K.J. Borkowski, S.P. Reynolds, P. Ghavamian, W.P. Blair, K.S. Long, & R. Sankrit. *Dust in a Type Ia Supernova Progenitor: Spitzer Spectroscopy of Kepler's Supernova Remnant*, 2012, ApJ, 755, 3.

- **B.J. Williams**, W.P. Blair, J.M. Blondin, K.J. Borkowski, P. Ghavamian, K.S. Long, J.C. Raymond, S.P. Reynolds, J. Rho, & P.F. Winkler. *RCW 86: A Type Ia Supernova in a Wind-blown Bubble*, 2011, ApJ, 741, 96.

- **B.J. Williams**, K.J. Borkowski, S.P. Reynolds, P. Ghavamian, J.C. Raymond, K.S. Long, W.P. Blair, R. Sankrit, R.C. Smith, S. Points, P.F. Winkler. *Dusty Blastwaves of Two Young LMC Supernova Remnants: Constraints on Postshock Compression*, 2011, ApJ, 729, 65.

- R. Sankrit, **B.J. Williams**, K.J. Borkowski, T.J. Gaetz, J.C. Raymond, W.P. Blair, P. Ghavamian, K.S. Long, & S. P. Reynolds. *Dust Destruction in a Non-radiative Shock in the Cygnus Loop Supernova Remnant*, 2010, ApJ, 712, 1092.

- **B.J. Williams**, K.J. Borkowski, S.P. Reynolds, J.C. Raymond, K.S. Long, J.A. Morse, W.P. Blair, P. Ghavamian, R. Sankrit, S.P. Hendrick, R.C. Smith, S. Points, P.F. Winkler. *Ejecta, Dust, and Synchrotron Radiation in B0540-69.3: A More Crab-Like Remnant than the Crab*, 2008, ApJ, 687, 1054

- W.P. Blair, P. Ghavamian, K.S. Long, **B.J. Williams**, K.J. Borkowski, S.P. Reynolds, R. Sankrit. *Spitzer Space Telescope Observations of Kepler's Supernova Remnant: A Detailed Look at the Circumstellar Dust Component*, 2007, ApJ, 662, 998.

- **B.J. Williams**, K.J. Borkowski, S.P. Reynolds, W.P. Blair, P. Ghavamian, S.P. Hendrick, K.S. Long, J.C. Raymond, R. Sankrit, R.C. Smith, S. Points, P.F. Winkler. *Dust Destruction in Fast Shocks of Core-Collapse Supernova Remnants in the Large Magellanic Clouds*, 2006, ApJL, 652, 33.

- K.J. Borkowski, **B.J. Williams,** S.P. Reynolds, W.P. Blair, P. Ghavamian, S.P. Hendrick, K.S. Long, J.C. Raymond, R. Sankrit, R.C. Smith, S. Points, P.F. Winkler. *Dust Destruction in Type Ia Supernova Remnants in the Large Magellanic Cloud*, 2006, ApJL, 642, 141.

Submitted for Publication

- Hitomi Collaboration. *Hitomi Constraints on the 3.5 keV Line in the Perseus Galaxy Cluster,* submitted to ApJ.

Other Publications

- T. Temim, **B.J. Williams**, L. Lopez. *The Many Faces of Supernova Remnants*, 2015, Chandra News, Issue 22, Published by the Chandra X-ray Center

- **B.J. Williams**, T. Temim. *Infrared Emission from Supernova Remnants: Formation and Destruction of Dust*, 2016, Springer Handbook of Supernovae. Review article.

Students Mentored

Nina Coyle, University of Chicago. NASA summer internship program, 2014. Project: "Expansion Velocities of Ejected Material from Tycho's Supernova." Co-mentored with Rob Petre.

Aaron Tran, University of California-Berkeley. NASA summer internship program, 2014. Project: "Particle Acceleration at the Shock of Tycho's 1572 Supernova." Co-mentored with Rob Petre.

Total Science PI Funding

$50,752	XMM-Newton Guest Observer Program, 2016
$46,620	Hubble Guest Observer Program, 2015
$148,500	Chandra Guest Observer Program, 2015
$42,107	NASA Astrophysics Data Analysis Program, 2014
$52,225	XMM-Newton Guest Observer Program, 2014
$8,000	SOFIA Guest Observer Program, 2014
$64,091	Chandra Guest Observer Program, 2013
$32,225	Herschel Guest Observer Program, 2012
$61,879	NASA Astrophysics Data Analysis Program, 2012
$200,751	NASA Astrophysics Data Analysis Program, 2010
$707,150	**TOTAL**

Professional Activity

Member, American Astronomical Society (AAS)
Member, American Physical Society (APS)
Member, High Energy Astrophysics Division of the AAS
Co-Investigator, Survey and Time-Domain Astronomical Research Explorer (STAR-X)
Science Working Group, Astro-H Observatory
Science Working Group, ATHENA Observatory
Science Working Group, X-ray Surveyor
Referee, *The Astrophysical Journal*
Referee, *Astronomy & Astrophysics*
Referee, *Monthly Notices of the Royal Astronomical Society*
Referee, *Publications of the Astronomical Society of Japan*

Colloquia/Seminars

October 2015	Seminar, Rutgers University Physics Dept.
March 2014	Seminar, University of Delaware Dept. Of Physics and Astronomy
August 2013	Colloquium, Astrophysics Science Division, NASA GSFC
February 2013	Colloquium, Towson University, Dept. Of Physics, Chemistry, and Geoscience
October 2012	Colloquium, SOFIA Science Center, NASA Ames, Mountain View, CA
September 2012	Seminar, Yale Center for Astronomy and Astrophysics
November 2011	Colloquium, N.C. State University Physics Department
March 2011	Seminar, Space Telescope Science Institute, Baltimore, MD
March 2011	Seminar, NASA GSFC
July 2010	Seminar, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA

Conference Talks

August 2016	COSPAR General Assembly (canceled), Istanbul, Turkey
June 2016	An Odyssey in Space After Stellar Death, Crete, Greece
January 2016	AAS Winter Meeting
July 2015	IAU General Assembly, Honolulu, HI
May 2015	Fifty-One Ergs, Raleigh, NC
November 2014	15 Years of Science with Chandra, Boston, MA
August 2014	Supernovae in the Local Universe, Australia
June 2014	The X-ray Universe, Dublin, Ireland
June 2014	AAS Summer Meeting, Boston, MA
September 2013	Observational Signatures of Type Ia SNe, Leiden, Netherlands
May 2013	Fifty-One Ergs, Raleigh, NC
May 2013	The Fast and the Furious, Madrid, Spain
November 2012	Dust in Core-Collapse SNe, Ascona, Switzerland
October 2012	Nature's Particle Accelerators, Annapolis, MD
August 2012	Cosmic Kaleidoscope, Kruger, South Africa
March 2012	Mass Loss Return, Baltimore, MD
January 2010	AAS Winter Meeting, Washington, D.C.

Successful Proposals

Observations of PKS 1209-51/52: A Cygnus Loop Sibling?, XMM-Newton Observatory, 2016, ESA, **PI – B.J. Williams**, Budget amount **$51K**

N103B: A Type Ia Remnant with Circumstellar Interaction... Kepler's Older Cousin?, Chandra X-ray Observatory, 2015, NASA, **PI – B.J. Williams**, Budget amount **$149K (Chandra), $46K (Hubble)**. Time: 400 ks, plus 5 HST orbits

Suzaku Observations of G189.6+3.3: An SNR Companion to IC 443?, 2014, NASA Astrophysics Data

Analysis Program, **Science PI – B.J. Williams**, Budget PI – R. Petre, **$42K**

Observations of G189.6+3.3: An SNR Companion to IC 443?, Suzaku (Astro-E2), 2014, JAXA, Priority B, PI – **B.J. Williams**

Gas-Phase Abundance Variations from Dust Grain Sputtering in an SNR Shock, XMM-Newton Observatory, 2013, ESA, **Science PI – B.J. Williams**, Budget PI – R. Petre, **$52K**

XMM-Newton Observations of G330.2+1.0, XMM-Newton Observatory, 2013, ESA, Priority C, PI – **B.J. Williams**

Dynamics of a Type Ia SNR: Proper Motions in Tycho, Chandra X-ray Observatory, 2013, NASA, **Science PI – B.J. Williams,** Budget PI – R. Petre, **$64K**

Dynamics of the Remnant of Kepler's Type Ia Supernova, Chandra X-ray Observatory, 2013, NASA, PI – K.J. Borkowski

The Composition of Dust in a Type IIn Supernova, SOFIA, 2013, NASA, **Science PI – B.J. Williams**, Budget PI – R. Petre, **$8K**

A New Epoch of EVLA Observations of Tycho's SNR: Proper Motions and More, JVLA, 2013, Priority A, PI – J.W. Hewitt

Observations of G327.6+14.6=SN AD1006: high-resolution continuum plus HI, JVLA, 2013, Priority B, PI – D.A. Green

A Multiwavelength Study of Tycho's Supernova Remnant, 2012, NASA Astrophysics Data Analysis Program, **Science PI – B.J. Williams**, Budget PI – R. Petre, **$62K**

Kepler's SNR: A Type Ia Supernova from a Single Degenerate System?, Hubble Space Telescope, 2012, Space Telescope Science Institute, PI – R. Sankrit

Herschel imaging of SNR G292.0+1.8: Cas A's older cousin?, Herschel Space Observatory, 2011, ESA, **Science PI – B.J. Williams**, Budget PI – P. Ghavamian, **$32K**

Dust Destruction in the ISM: The Cygnus Loop Blast Wave, 2010, Hubble Space Telescope, Space Telescope Science Institute, NASA, PI – J.C. Raymond

Galactic Supernova Remnants in the Infrared: An Archival Survey with Spitzer's MIPS and IRS, 2009, NASA Astrophysics Data Analysis Program, **Science PI – B.J.** Williams, PI – K.J. Borkowski, **$201K**

Spectral Mapping of Kepler's SNR, Spitzer Science Center, 2008, NASA, PI - S.P. Reynolds

SN 185 and its Remnant RCW 86: A Type Ia Explosion within a Bubble?, Spitzer Science Center, 2008, NASA, PI - K.J. Borkowski

Quasi-Historical Type Ia SNRs, Spitzer Science Center, 2007, NASA, PI - S.P. Reynolds

Thermal and Nonthermal Emission from the Crab's Twin: SNR B0540-69.3, Spitzer Science Center, 2006, NASA, PI - S.P. Reynolds

Supernova Remnants in X-Rays and Infrared: 0453.1-66.55 and DEM L204, XMM-Newton, 2006, European Space Agency, PI - K.J. Borkowski

Teaching Experience

Summer 2011, 2010 — **PY 299 - Introductory Quantum Mechanics.**
NCSU, Raleigh, NC.
Developer and instructor for introductory course in quantum physics for junior/senior-level undergraduate physics majors.

Fall 2010 — **PHY 211 - General Physics I**.
Meredith College, Raleigh, NC
Adjunct faculty and instructor for two sections of introductory classical mechanics.

Fall 2010 — **PHY 241 – General Physics I Laboratory**.
Meredith College, Raleigh, NC
Adjunct faculty and instructor for two sections of classical mechanics lab.

Fall 2009 – Spring 2010 — **PY 411/412 – Classical Mechanics I-II**.
NCSU, Raleigh, NC
Supplementary Instructor, as part of PY 885, Doctoral Supervised Teaching, under the guidance of Dr. Stephen Reynolds. Prepared and gave approximately 12 lectures during the year.

Fall 2004 - Spring 2005 — **PY 205 - Physics for Engineers and Scientists**.
NCSU, Raleigh, NC
Graduate Teaching Assistant for laboratory sections of PY 205.

Press Coverage

RCW 86: "*NASA Telescopes Help Solve Ancient Supernova Mystery*,"
http://www.nasa.gov/mission_pages/spitzer/news/spitzer20111024.html

SN 1006: "*X-Ray View of A Thousand-Year-Old Cosmic Tapestry,*"
http://chandra.harvard.edu/photo/2013/sn1006/

N103B: "*New Suspect Identified in Supernova Explosion,"*
http://www.nasa.gov/jpl/spitzer/supernova-20140604/

3C 397: "*Suzaku Studies Supernova 'Crime Scene,' Shows a Single White Dwarf to Blame,"*
http://www.nasa.gov/content/goddard/suzaku-studies-supernova-crime-scene-shows-a-single-white-dwarf-to-blame

Tycho's Supernova Remnant: "*Chandra Movie Captures Expanding Debris From a Stellar Explosion,"*
http://chandra.si.edu/photo/2016/tycho/

Perseus Cluster: *"Hitomi Mission Charts Hot Winds of a Galaxy Cluster for the First Time"*
http://www.nasa.gov/feature/goddard/2016/hitomi-mission-charts-hot-winds-of-a-galaxy-cluster-for-the-first-time

Astronomy Picture of the Day:
http://apod.nasa.gov/apod/ap130423.html
http://apod.nasa.gov/apod/ap111110.html
http://apod.nasa.gov/apod/ap160601.html

Leadership and Outreach Activities

Guest Blogger, *Blueshift,* NASA's Astrophysics blog, 2013 – present
On two occasions, I have written guest blog posts for *Blueshift* (http://asd.gsfc.nasa.gov/blueshift/), NASA's Astrophysics blog. One post was on the physics of supernova remnants (http://asd.gsfc.nasa.gov/blueshift/index.php/2013/02/22/brians-blog-a-look-into-the-building-blocks-of-life/), while the other was about my observing run on *SOFIA*, NASA's airborne observatory (http://asd.gsfc.nasa.gov/blueshift/index.php/2014/09/05/sofia-ride/).

American Astronomical Society Liaison, Congressional Visits Day, 2013
I was part of a delegation of about a dozen astronomers from all over the country selected to visit Capitol Hill over a two-day period to meet with Congressional members and staffers about federal funding for astronomy. I prepared the "leave-behind" sheet for the group to distribute in all meetings.

Panelist, "Ask an Astrophysicist" website, 2012 – present
NASA GSFC runs a web service called "Ask an Astrophysicist," where anyone from anywhere in the world can write us with their questions. I serve along with about a dozen as part of a rotating cast of astronomy experts who provide answers to these questions.

Coordinator, "Supernova Lunch" Seminar series, 2012 – 2014
I organized and led biweekly seminars at NASA Goddard for all topics relating to supernova research.

State Event Leader, North Carolina Science Olympiad, 2009 – 2011
The North Carolina Science Olympiad is a branch of the nationwide team science competition for elementary, middle, and high school students. I was the North Carolina Event Leader for the middle and high school astronomy events. I wrote, administered, and judged the test at the statewide competition.

Public Outreach Liaison, NCSU Astrophysics, 2006 – 2012
I was the contact person for public and school requests for guest speakers from the NCSU astrophysics research group. I have presented dozens of astronomy talks to students all levels, on topics from the

moon to the accelerating universe. I have served as a science fair judge on several occasions.

Coordinator, NCSU Astronomy Open House, 2006 – 2012
I coordinated and ran the semi-annual Astronomy Open House that attracted well over 100 people each semester to our astronomy lab teaching site for an evening of physics demonstrations and stargazing on our university-owned telescopes.

Coordinator, NCSU Astrophysics Group Meetings, 2007 – 2010
While a graduate student, I organized and led the weekly meetings for the astrophysics research group.

Honors, Awards, and Achievements

October 2011	NASA Postdoctoral Program Fellowship
July 2011	"Early Career" Travel Grant, High Energy Astrophysics Division of the American Astronomical Society
March 2009	First Place, NCSU Graduate Research Symposium, Physical and Mathematical Sciences Division. Presentation entitled, "*Supernova Remnants as a Probe of Dust Grains in the Interstellar Medium*"
May 2004	Perfect scores on GRE Math (800) and Writing (6.0).
April 2004	High Scholarship in Physics, Florida State University
April 2004	Elected as a member of Sigma Pi Sigma, the National Physics Honor Society
August 2000-May 2004	Florida Academic Scholars Bright Futures Scholarship- Full academic scholarship for undergraduate education at FSU
August 2000-May 2004	Florida State University Honors Program Scholarship
October 1999	Perfect score on SAT Math (800)