

Amy Yarleen Lien

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Research Interests and Relevant Experience

<u>Research Interests</u>	Gamma-ray bursts, supernovae, gravitational waves, time-domain astrophysics, multi-messenger studies, high-energy astrophysics, stellar evolution, early universe, cosmology
<u>Teaching Experience</u>	Lectures, mentoring student research projects, discussion sections
<u>Computer Skills</u>	Fluent in C, Python, Shell Script. IDL, AWK, Xspec, FTOOLS. Experienced in Matlab, Mathematica, Fortran

Positions

<u>Sept 2017 – Present</u>	Assistant Research Scientist ^{1,2,*} ,
<u>Sept 2013 – Sept 2017</u>	Postdoctoral Research Associate ^{1,2,*} , ¹ NASA Goddard Space Flight Center and Center for Space Science and Technology (CRESST), ² University of Maryland Baltimore County *~80% time for supportive work of the <i>Swift</i> Burst Alert Telescope ~20% time for personal research
<u>Sept 2011 – Aug 2013</u>	NASA Postdoctoral Fellow, NASA Goddard Space Flight Center

Education

<u>Aug 2005 – Aug 2011</u>	Ph.D., Department of Astronomy, University of Illinois at Urbana-Champaign
<u>Sept 2001 – June 2005</u>	B.S. Department of Physics, National Central University (Taiwan)

Professional Experience

Sept 2011 – Present:

- Research:
 1. Exploring the connection between gamma-ray bursts (GRBs), supernovae, and gravitational waves via multi-messenger observations.
 2. Studying the observed GRB properties with the Neil Gehrels *Swift* Observatory (*Swift*).
 3. Chasing gravitational wave counterparts in the Burst Alert Telescope (BAT) onboard *Swift*
 4. Probing the early universe with long GRBs.
 5. Making forecasts for future telescopes and exploring optimal GRB detection strategies.
 6. Constructing the *Swift*/BAT 157-month hard X-ray survey catalog (<https://swift.gsfc.nasa.gov/results/bs157mon/>).
- Supporting tasks for *Swift* Burst Alert Telescope (BAT):
 1. Data analysis for the BAT-detected GRB, maintaining and updating the public GRB catalog website (<http://swift.gsfc.nasa.gov/results/batgrbcatalog/>).
 2. Maintaining the BAT hard X-ray transient monitor scripts and public webpages (<http://swift.gsfc.nasa.gov/results/transients/>).
 3. Providing BAT data analysis when required, and offering help for users who have questions regarding the BAT analysis.
 4. Maintaining the BAT-team machines, arranging shifts for the duty scientists.
 5. Writing new automatic scripts for new BAT operation, including prompt data search following gravitational wave detections.
 6. Assisting operation of the BAT. Constructing flight commands to send to the space telescopes.

Jan 2007 – Aug 2011

Advisor: Prof. Brian Fields, University of Illinois at Urbana-Champaign

- Code development for detailed forecasting of core-collapse supernova detections for major future surveys in both optical and radio wavelengths, and exploration of science potentials of the detections via multi-messenger observations.

May 2006 – Dec 2006

Advisor: Prof. Joseph Mohr, University of Illinois at Urbana-Champaign

- Code development for mock observations for the galaxy cluster search of the Dark Energy Survey, and seeking the optimal filter for galaxy cluster detections.

Selected Publications

* See full publication list on the ADS search engine (<http://adsabs.harvard.edu>):
35 refereed and 800+ non-refereed (e.g., GCN circulars or ATEs) articles.

Major publications:

1. *The Third Swift Burst Alert Telescope Gamma-Ray Burst Catalog*
Amy Lien, Takanori Sakamoto, Scott D. Barthelmy et al.,
The Astrophysical Journal, Vol. 829, Issue 1, article id 7, 47 pp. (2016)
arXiv:1606.01956
2. *Modeling the Swift BAT Trigger Algorithm with Machine Learning*
Philip B. Graff, **Amy Lien**, John G. Baker et al.,
The Astrophysical Journal, Vol. 818, Issue 1, article id. 55, 10 pp. (2016)
arXiv:1509.01228
3. *Swift Observations of Gamma-Ray Burst Pulse Shapes: GRB Pulse Spectral Evolution Clarified*
Jon Hakkila, **Amy Lien**, Takanori Sakamoto et al.,
The Astrophysical Journal, Vol. 815, Issue 2, article id. 134, 16 pp. (2015)
4. *Probing the Cosmic Gamma-ray Bursts Rate
with Trigger Simulations for the Swift Burst Alert Telescope*
Amy Lien, Takanori Sakamoto, Neil Gehrels, et al.
The Astrophysical Journal, vol. 783, Issue 1, article id. 24, 22 pp. (2014)
arXiv:1311.4567
5. *The Diffuse Gamma-ray Background from Type Ia Supernovae*
Amy Lien, Brian D. Fields
The Astrophysical Journal, vol. 747, Issue 2, article id. 120, 12 pp. (2012)
arXiv:1201.3447
6. *Radio Supernovae in the Great Survey Era*
Amy Lien, Nachiketa Chakraborty, Brian D. Fields, and Athol Kemball
Astrophysical Journal, vol. 740, Issue 1, id. 23 (2011)
arXiv:1107.0775
7. *Synoptic Sky Surveys and the Diffuse Supernova Neutrino Background:
Removing Astrophysical Uncertainties and Revealing Invisible Supernovae*
Amy Lien, Brian D. Fields, and John F. Beacom
Physical Review D, vol. 81, Issue 8, id. 083001 (2010)
arXiv:1001.3678
8. *Cosmic Core-Collapse Supernovae from Upcoming Sky Surveys*
Amy Lien and Brian D. Fields
Journal of Cosmology and Astroparticle Physics, Issue 01, pp. 047 (2009)

Other selected publications:

9. *The afterglow and kilonova of the short GRB 160821B*
Troja et al. MNRAS, Volume 489, Issue 2, p.2104-2116 (2019)
10. *Swift spectra of AT2018cow: A White Dwarf Tidal Disruption Event?*
Kuin et al. MNRAS, Volume 487, Issue 2, p.2505-2521 (2019)
11. *The 105-Month Swift-BAT All-sky Hard X-Ray Survey*
Oh et al. The ApJ Supplement, Volume 235, Issue 1, article id. 4, 14 (2018)
12. *Swift and NuSTAR Observations of GW170817: Detection of a Blue Kilonova*
Evans et al. Science, Volume 358, Issue 6370, pp. 1565-1570 (2017)
13. *The X-ray Counterpart to the Gravitational-wave Event GW170817*
Troja et al. Nature, Volume 551, Issue 7678, pp. 71-74 (2017)
14. *The Environment of the Binary Neutron Star Merger GW170817*
Leven et al. ApJ Letters Vol 848, Issue 2, L28, 9 (2017)
15. *Multi-messenger Observations of a Binary Neutron Star Merger*
Abbott et al. The ApJ Letters, Volume 848, Issue 2, article id. L12, 59 (2017)
16. *Swift Follow-up of Gravitational Wave Triggers: Results from the First aLIGO run and Optimization for the Future*
Evans et al., MNRAS, Vol. 462, Issue 2, p.1591-1602 (2016)
17. *Do the Fermi Gamma-Ray Burst Monitor and Swift Burst Alert Telescope see the Same Short Gamma-Ray Bursts?*
Burns et al. ApJ. Vol. 818, Issue 2, article id. 110, 10 (2016)
18. *The Central Engine of GRB 130831A and the Energy Breakdown of a Relativistic Explosion*
De Pasquale et al., MNRAS, Vol. 455, Issue 1, p. 1027-1042 (2016)
19. *Happy Birthday Swift: Ultra-long GRB 141121A and Its Broadband Afterglow*
Cucchiara et al. ApJ, Vol. 812, Issue 2, article id. 122, 13 (2015)
20. *iPTF14yb: The First Discovery of a Gamma-Ray Burst Afterglow Independent of a High-energy Trigger*
Cenko et al., ApJ Letters, Vol 803, Issue 2, L24, 6 (2015)
21. *GRB 130925A: an ultralong gamma ray burst with a dust-echo afterglow, and implications for the origin of the ultralong GRBs*
Evans et al., MNRAS, Vol. 444, Issue 1, p.250-267 (2014)
22. *The Swift/BAT Hard X-Ray Transient Monitor*
Krimm et al., ApJS, Volum 209, Issue 1, article id. 14, 33 pp. (2013)

Principal Investigator Research Grants

- Quantifying the Instrumental Effects and Systematic Uncertainties in the Durations of *Swift*/BAT Gamma-ray Bursts 2017-2019
- Swift Guest Investigator Program (Cycle 13): \$40K
- Chasing Short Gamma-Ray Bursts with Swift and Fermi 2014-2016
- Swift Guest Investigator Program (Cycle 10): \$39K
- High Redshift Gamma-Ray Bursts from Swift 2013-2014
- Swift Guest Investigator Program (Cycle 9): \$33.5K

Selected/Recent Co-Investigator Research Projects

- Gamma-ray Bursts Similar to GRB 170817A: 2019-2022
Comprehensive Search in the BATSE and Swift Data
PI: Peter Veres (University of Alabama, Huntsville, U.S.A.)
Program: Astrophysics Data Analysis Program (ADAP)
- A missing population of short duration gamma-ray bursts 2018-2021
PI: Eleonora Troja (University of Maryland, College Park, U.S.A.)
Program: Astrophysics Data Analysis Program (ADAP)
- Deeper, Wider, Faster: 2017-2018
High Energy Counterparts to the Fastest Bursts in the Sky
PI: Tyler Pritchard (Swinburne University of Technology, Australia)
Program: Swift Guest Investigator Program (Cycle 13)

Invited Talks

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|------------------|---|
| <u>Sep. 2019</u> | Ioffe Workshop on GRBs and other transient sources, St. Petersburg, Russia
Title: Observing the transient sky with the Neil Gehrels Swift Observatory |
| <u>Jul. 2019</u> | Seminar at the National Taiwan Normal University, Taipei, Taiwan
Title: Gamma-Ray Bursts, the Swift Burst Alert Telescope,
and the Era of Gravitational Waves |
| <u>Jan. 2019</u> | AAS Press Panel on the AT2018cow, Seattle, WA
Title: AT2018cow: A White Dwarf Torn Apart by a Black Hole? |
| <u>Oct. 2018</u> | Student Colloquium at Tamkang University, Tamsui, Taiwan
Title: Gamma-ray bursts from the <i>Swift</i> Burst Alert Telescope |
| <u>Oct. 2018</u> | Taipei Gravitational Wave Group Conference, Tamkang University, Tamsui, Taiwan
Title: Gamma-ray Bursts in the Era of Multi-Messenger Astronomy (talk #1)
Catching Electromagnetic Counterparts for Gravitational Waves Events (talk #2) |
| <u>Oct 2017</u> | CTC seminar, University of Maryland, College Park |

Dec 2016 Title: Gamma-ray Bursts from the Swift Burst Alert Telescope
 Astroparticle Physic Workshop at Yachay Tech, Quito, Ecuador
Oct 2016 Title: Gamma-ray Bursts from the Swift Burst Alert Telescope
 The Eighth Huntsville Gamma-Ray Burst Symposium, Huntsville, Alabama
 Title: The Third Swift Burst Alert Telescope Gamma-Ray Burst Catalog:
 Instrumental Sensitivity and Implication on the High-Redshift GRBs
Dec 2015 The Fourth AMON workshop, Penn State University, Pennsylvania
 Title: Swift-BAT as a Triggering Facility
Sept 2015 Special Seminars, CEA Saclay, France
 Title: Gamma-ray Bursts from the Swift Burst Alert Telescope:
 Probing Intrinsic Distributions with Trigger Simulations
Apr 2015 Astronomical Sciences Seminars, Virginia Tech, Virginia
 Title: Probing the Star-Formation History with Core-Collapse Supernovae,
 Gamma-Ray Bursts, and Neutrinos in the Great Survey Era
Apr 2015 ITC Seminar, CfA, Harvard University, Boston
 Title: Gamma-ray Bursts from the Swift Burst Alert Telescope: Probing
 Intrinsic Distributions with Trigger Simulations
Jan 2015 Seminar, Academia Sinica, Taiwan
 Title: Ten Years of Swift: The Third Swift Burst Alert Telescope Gamma-Ray
 Burst Catalog
July 2013 Seminar, Academia Sinica, Taiwan
 Title: Connecting Core-Collapse Supernovae and Gamma-Ray Bursts in the
 Great Survey Era
July 2013 Seminar, National Central University, Taiwan
 Title: Connecting Core-Collapse Supernovae and Gamma-Ray Bursts in the
 Great Survey Era
Feb 2012 Seminar, Naval Research Laboratory
 Title: Core-Collapse Supernovae in the Great Survey Era
Aug 2011 Seminar, National Tsing-Hua University, Taiwan
 Title: Core-Collapse Supernovae in the Great Survey Era
July 2011 Seminar, NASA Goddard Space Flight Center
 Title: Revealing Optically Invisible Core-Collapse Supernovae in the Great
 Survey Era
Apr 2011 The Second Annual CCAPP Symposium, Ohio State University
 Title: Core-Collapse Supernovae in the Great Survey Era:
 Impact on Particle Astrophysics and Cosmology

Feb 2011 Triangle Nuclear Theory Colloquium, North Carolina State University
 Title: Core-Collapse Supernovae in the Great Survey Era:
 Impact on Particle Astrophysics and Cosmology

Mentoring Experience

<u>Summer 2019</u>	Quantifying uncertainties in the durations of <i>Swift</i> /BAT Gamma-ray Bursts Student: Mike Moss, George Washington University
<u>Summer 2018</u>	Quantifying uncertainties in the durations of <i>Swift</i> /BAT Gamma-ray Bursts Student: Mike Moss, George Washington University
<u>Summer 2018</u>	Study of GRB pulses and X-ray flares (co-mentor) Student: Fatima Hussein, University of the Virgin Islands
<u>Summer 2017</u>	GRB pulse-shape study Student: Juan-Carlos Martinez, University of the Virgin Islands
<u>Fall 2016</u>	Spectral joint-fit analysis for GRBs from <i>Swift</i> /BAT and <i>Suzaku</i> /WAM Student: Austin Kim, University of Maryland at College Park
<u>Fall 2016</u>	Probing star-formation rate with Bayesian analysis of Swift GRBs (co-mentor) Student: Anjali Mittu, University of Maryland at College Park
<u>Summer 2016</u>	GRB pulse-shape study Student: Jared Hanley, University of the Virgin Islands
<u>Summer 2015</u>	Chasing short GRBs with <i>Swift</i> and <i>Fermi</i> Student: Charles Law, Harvard University
<u>Summer 2015</u>	Study of GRB pulses and X-ray flares (co-mentor) Student: Jason Baron, University of the Virgin Islands
<u>Summer 2014</u>	High redshift GRBs from <i>Swift</i> Student: Kevin Chen, University of California, Berkeley
<u>Summer 2014</u>	Chasing short GRBs with <i>Swift</i> and <i>Fermi</i> (co-mentor) Student: John Kerin, Georgetown University

Teaching Experience: instructor

<u>Fall 2018</u>	Special Projects in Astronomy: Astronomy Research Techniques (ASTR288C), University of Maryland, College Park Team-teaching with Sean Griffin (University of Maryland, College Park) https://swift.gsfc.nasa.gov/results/BATbursts/ASTR_288C/Index.html
<u>Fall 2017</u>	Special Projects in Astronomy: Astronomy Research Techniques (ASTR288C), University of Maryland, College Park https://userpages.umbc.edu/~alien/ASTR_288C_2017/Index.html

Teaching Experience: teaching assistant

<u>Fall 2010</u>	TA for Phys 598 (Topics in Computational Physics and Astrophysics) Instructor: Prof. Stuart Shapiro
<u>Summer 2009</u>	TA for Astro100 (Perspectives to Astronomy) Instructor: Dr. Ashley Ross
<u>Spring 2009</u>	TA for Astro330 (Extraterrestrial Life) with discussion sections Instructor: Prof. Leslie Looney
<u>Fall 2008</u>	TA for Astro121* (The Solar System) with discussion sections Instructor: Prof. Edmund Sutton
<u>Summer 2008</u>	TA for Astro100 (Perspectives in Astronomy) Instructor: Dr. Ashley Ross
<u>Spring 2008</u>	TA for Astro596 (Physical Cosmology) Instructor: Prof. Brian Fields
<u>Fall 2007</u>	TA for Astro502 (Theory Diffuse Matter Dynamics) Instructor: Prof. Charles Gammie TA for Astro330 (Extraterrestrial Life) Instructor: Prof. Leslie Looney
<u>Spring 2007</u>	TA for Astro405 (Solar System and Interstellar Medium) Instructor: Prof. Ronald Webbink
<u>Spring 2006</u>	TA for Astro100* (Perspectives to Astronomy) Instructor: Prof. Thomasanna Hail
<u>Fall 2005</u>	TA for Astro100* (Perspectives in Astronomy) Instructor: Prof. Laird Thompson

* Classes including night observing sections and solar observing sections.

Community Service and Outreach

- 2019 AAS Press Panel on the event AT2018cow
<https://aasnova.org/2019/01/13/aas-233-day-4/>
<https://www.youtube.com/watch?v=P8VhpMRxNW4>
- Representing the *Swift* telescope at the NASA Science Jamborees, the American Astronomical Society (AAS) meetings, and the NASA Goddard Open House
- Serving as a referee for academic journals (ApJ, MNRAS)
- Serving as a reviewer for grant proposals (*Swift*, *Fermi*, *Hubble*, *NuSTAR*, NASA Earth and Space Science Fellowship)
- Participating in the volunteer mentor program for Generation Hope
(<http://supportgenerationhope.org/generation-hope-19>)

- Participating in AAAS STEM volunteer program to support high school science classes/activities (<https://www.aaas.org/programs/STEM-volunteers>)

References

Dr. Brad Cenko	NASA Goddard Space Flight Center, Code 661 Address: 8800 Greenbelt Rd, Greenbelt Rd, Greenbelt, MD 20771 Email: brad.cenko@nasa.gov Phone: 301-286-4678
Dr. Scott Barthelmy	NASA Goddard Space Flight Center, Code 661 Address: 8800 Greenbelt Rd, Greenbelt Rd, Greenbelt, MD 20771 Email: scott.d.barthelmy@nasa.gov Phone: 301-286-3106
Prof. Takanori Sakamoto	Department of Physics and Mathematics, College of Science and Engineering, Aoyama Gakuin University Address: 5-10-1 Fuchinobe, Chuo-ku, Sagamihara-shi, Kanagawa 252-5258, Japan Email: tsakamoto@phys.aoyama.ac.jp Phone: +81-42-759-6275
Prof. Brian Fields	Department of Astronomy, University of Illinois at Urbana-Champaign Address: 1002 W. Green St. Urbana, IL. 61801, U.S.A Email: bdfields@illinois.edu Phone: 217-333-5529
Prof. Jon Hakkila	Department of Physics and Astronomy College of Charleston Address: 311 Rita Hollings Science Center, 58 Coming St. Charleston, SC. 29424 Email: hakkilaj@cofc.edu Phone: 843-953-6387