

# J. Michael Burgess

· ASTROPHYSICIST

Wohlfahrtstraße 2A 80393, Munich, Germany

☎ (+49) 173.604.6869 | ✉ jburgess@mpe.mpg.de | 🏠 www.jmichaelburgess.com | 📷 grburgess | 🐦 @morethanpriors

“Sometimes all we have left are pictures and fear”

## Education

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### Ph.D. in Physics

University of Alabama in Huntsville,  
USA

DISCERNING THE PHYSICAL PROPERTIES OF GAMMA-RAY BURSTS VIA TIME-RESOLVED ANALYSIS WITH PHYSICAL SPECTRAL MODELS

2011 - 2013

Advisor: Dr. Robert D. Preece

### Master in Physics

University of Alabama in Huntsville,  
USA

2008 - 2011

Advisor: Dr. Robert D. Preece

### Bachelor of Science

University of Alabama in Huntsville,  
USA

DUAL DEGREE IN MATH AND PHYSICS

2003 - 2008

## Skills

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<b>Programming Languages</b>	C/C++, FORTRAN, Python, Cython, R, Stan, JAGS, IDL, $\LaTeX$ , emacs
<b>Statistics/Analysis</b>	Full Bayesian inference, maximum likelihood, XSPEC, 3ML (developer)
<b>Development</b>	git, travis, coverage, python frameworks, docker, conda
<b>Instruments</b>	Fermi-GBM, Fermi-LAT, Swift-BAT, Swift-XRT, GROND, POLAR
<b>Languages</b>	English

## Experience

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### Max-Planck-Institut für extraterrestrische Physik

Garching, Germany

HUMBOLDT RESEARCH FELLOW

2017 - Now

I am currently a member of Dr. Jochen Greiner's research group studying GRB emission physics via data from optical to high-energy gamma-ray instruments

### KTH Royal Institute of Technology

Stockholm, Sweden

OSKAR KLEIN RESEARCH FELLOW

2014 - 2017

As a member of the GRB group at KTH under the direction of Felix Ryde, I investigated several aspects of GRB physics and analysis as well as assisting graduate students in their thesis studies. Developed physical models for GRB spectra and Bayesian software to fit Fermi data to models. Investigated spectral evolution in GRBs and assessed validity of classic spectral correlations related to cosmology and physical model inference. Designed novel scheme to fit Type Ia SNe cosmology data.

### University of Alabama in Huntsville

Huntsville, AL, USA

FERMI GBM TEAM

2009 - 2013

Developed the ability to fit physical spectral models to GRB data. Participated in daily satellite operations and data monitoring. Participated in GCN collaboration to quickly distribute information about GRB triggers. Developed many multinational collaborations on various research projects.

# Advising

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## Bjoern Blitzinger

ASSISTANT MASTER SUPERVISOR

- Modeling of the Fermi-GBM background with a focus on fitting the Earth's albedo flux and the cosmic  $\gamma$ -ray background spectra

*MPE, Garching, Germany*

2018-2019

## Francesco Berlato

ASSISTANT PH. D SUPERVISOR

- Using BALROG to locate GRBs with Fermi-GBM and understanding the inherent systematics of the instrument.

*MPE, Garching, Germany*

2017-present

## Simon Steinmaßl

ASSISTANT MASTER SUPERVISOR

- Bayesian modeling of x-ray binary data obtained by GROND

*MPE, Garching, Germany*

2018-2019

## Marco Grau

ASSISTANT BACHELOR SUPERVISOR

- Fitting physical afterglow models to multiwavelength data

*MPE, Garching, Germany*

2019

## Ana Bacelj

ASSISTANT MASTER SUPERVISOR

- Fitting hierarchical Bayesian correlation models to Fermi-GBM data

*MPE, Garching, Germany*

2017

## Felix Kunzweiler

ASSISTANT BACHELOR SUPERVISOR

- Construction of an object-oriented frame work for fitting and modeling the Fermi-GBM background

*MPE, Garching, Germany*

2018

## Liang Li

ASSISTANT PH. D SUPERVISOR

- Spectral analysis and correlations in GRB spectra

*KTH Royal Institute of Technology,*

*Stockholm, Sweden*

2014-2016

## Shabnam Iyyani

ASSISTANT PH. D SUPERVISOR

- Synchrotron and photospheric modeling of Fermi-GBM observed GRBs.

*KTH Royal Institute of Technology,*

*Stockholm, Sweden*

2014

# Teaching

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## Assistant Lecturer

APPLIED MULTI-MESSENGER ASTRONOMY 2 (STATISTICAL AND MACHINE LEARNING METHODS IN PARTICLE AND ASTROPHYSICS)  
(PH2282)

- Lecture 1
- Lecture 2
- Lecture 3

*Technical University of Munich,*

*Garching, Germany*

2019

## Assistant Lecturer

ASTROPARTICLE PHYSICS (SH2204)

*KTH Royal Institute of Technology,*

*Stockholm, Sweden*

2016

## Assistant Lecturer

ASTROPARTICLE PHYSICS (SH2204)

*KTH Royal Institute of Technology,*

*Stockholm, Sweden*

2014

## Assistant Lecturer

ASTROPHYSICS (SH2402)

*KTH Royal Institute of Technology,*

*Stockholm, Sweden*

2014

# Honors & Awards

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## INTERNATIONAL

2017	<b>Alexander von Humboldt Fellowship,</b>	<i>Munich, Germany</i>
2014	<b>Oscar-Klein Postdoctoral Fellowship,</b>	<i>Stockholm, Sweden</i>
2012	<b>AAS Chamblis Award,</b> American Astronomical Society Meeting	<i>Austin, TX, USA</i>
2010	<b>Alabama Space Grant Consortium Graduate Fellowship,</b>	<i>UAHuntsville, USA</i>
2008	<b>Curry Astrophysics Graduate Fellowship,</b>	<i>UAHuntsville, USA</i>
2007	<b>Vanderbilt Prize for Undergraduate Research in Physics and Astronomy,</b>	<i>Vanderbilt University, USA</i>
2007	<b>Alabama Space Grant Consortium Undergraduate Fellowship,</b>	<i>UAHuntsville, USA</i>
2006	<b>NASA Institute of Advanced Concepts Research Fellowship,</b>	<i>UAHuntsville, USA</i>
2003	<b>University of Alabama in Huntsville Academic Excellence Scholarship,</b>	<i>UAHuntsville, USA</i>

## DOMESTIC

# Presentation

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<b>Gamma-ray Bursts in the Gravitational Wave Era 2019</b>	<i>Yokohama, Japan</i>
SYNCHROTRON (INVITED)	<i>Oct. 2019</i>
<b>Ioffe Workshop on GRBs and other transient sources: 25 Years of Konus-Wind Experiment (KW25)</b>	<i>St. Petersburg, Russia</i>
SYNCHROTRON (INVITED)	<i>Sept. 2019</i>
Prompt Emission Session Chair	
<b>Nanjing GRB Conference</b>	<i>Nanjing, China</i>
SYNCHROTRON (INVITED)	<i>March. 2019</i>
Involved in prompt emission panel discussion	
<b>PyGamma</b>	<i>Heidelberg, Germany</i>
THE MULTI-MISSION MAXIMUM LIKELIHOOD FRAMEWORK (INVITED)	<i>March. 2019</i>
<b>XX Integral Conference</b>	<i>Geneva, Switzerland</i>
SYNCHROTRON	<i>Janurary 2019</i>
<b>POLAR Workshop</b>	<i>Geneva, Switzerland</i>
POLARIZATION	<i>December 2018</i>
<b>Deciphering the Violent Universe</b>	<i>Cancun, Mexico</i>
GRB SPECTRAL WIDTH	<i>Janurary 2017</i>
<b>Fermi Symposium</b>	<i>Garmish, Germany</i>
AWAKENING THE BALROG	<i>October 2017</i>
<b>GRB Symposium 2016</b>	<i>Huntsville, AL, USA</i>
ON THE FERMI GBM EVENT 0.4S GW-150914	<i>XX 2016</i>
<b>Imperial College London Statistics Seminar</b>	<i>London, United Kingdom</i>
EXPLORING GAMMA-RAY BURST VIA THE BAYESIAN PARADIGM (INVITED)	<i>XX 2016</i>
<b>TEXAS Symposium</b>	<i>Geneva, Switzerland</i>
AN EXTERNAL SHOCK ORIGIN OF GRB 141028A	<i>XX 2015</i>
<b>Fourteenth Marcel Grossmann Meeting</b>	<i>Rome, Italy</i>
TAKING THE BAND FUNCTION TOO FAR	<i>July 2015</i>

## 5th Fermi Symposium

TO SYNCHROTRON OR NOT TO SYNCHROTRON

Nagoya, Japan

Oct. 2014

## GRB 2013 Symposium

RELATING THE THERMAL AND NON-THERMAL COMPONENTS OF FERMI GRBs

Huntsville, AL, USA

XXX. 2013

## GRB 2012

EXPLORING FERMI GRBs VIA PHYSICAL SEDs

Malaga, Spain

Nov. 2012

## 3rd Fermi Symposium

CONSTRAINTS OF THE SYNCHROTRON SHOCK MODEL

Rome, Italy

Nov. 2011

## GRB 2010

CONSTRAINTS OF THE SYNCHROTRON SHOCK MODEL

Annapolis, MD< USA

Nov. 2010

## Writing

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**J Michael Burgess, et al.** *Gamma-ray bursts as cool synchrotron sources.* Nature Astronomy, 732:29. URL <http://dx.doi.org/10.1038/s41550-019-0911-z> (2019)

**J Michael Burgess, et al.** *A Bayesian Fermi-GBM short GRB spectral catalogue.* Monthly Notices of the Royal Astronomical Society, 490(1):927. URL <http://dx.doi.org/10.1093/mnras/stz2589> (2019)

**J M Burgess, et al.** *Time-resolved GRB polarization with POLAR and GBM - Simultaneous spectral and polarization analysis with synchrotron emission.* ASTRONOMY AND ASTROPHYSICS- ..., 627:A105. URL <http://dx.doi.org/10.1051/0004-6361/201935056> (2019)

**F Berlato, et al.** *Improved Fermi-GBM GRB Localizations Using BALROG.* The Astrophysical Journal, 873(1):60. URL <http://dx.doi.org/10.3847/1538-4357/ab0413> (2019)

**J Michael Burgess.** *The rest-frame Golenetskii correlation via a hierarchical Bayesian analysis.* Monthly Notices of the Royal Astronomical Society, 485(1):1262. URL <http://dx.doi.org/10.1093/mnras/stx1159> (2019)

**J Michael Burgess, et al.** *Awakening the BALROG: BAYesian Location Reconstruction Of GRBs.* Monthly Notices of the Royal Astronomical Society, 476(2):1427. URL <http://dx.doi.org/10.1093/mnras/stx2853> (2017)

**J Michael Burgess, et al.** *An External Shock Origin of GRB 141028A.* The Astrophysical Journal, 822(2):63. URL <http://dx.doi.org/10.3847/0004-637X/822/2/63> (2016)

**J Greiner, et al.** *On the Fermi-GBM Event 0.4 s after GW150914.* The Astrophysical Journal Letters, 827(2):L38. URL <http://dx.doi.org/10.3847/2041-8205/827/2/L38> (2016)

**D Bégué, et al.** *The Peculiar Physics of GRB 170817A and Their Implications for Short GRBs.* The Astrophysical Journal Letters, 851(1):L19. URL <http://dx.doi.org/10.3847/2041-8213/aa9d85> (2017)

**D Bégué & J Michael Burgess.** *The Anatomy of a Long Gamma-Ray Burst: A Simple Classification Scheme for the Emission Mechanism(s).* The Astrophysical Journal, 820(1):68. URL <http://dx.doi.org/10.3847/0004-637X/820/1/68> (2016)

**J Michael Burgess, et al.** *Taking the band function too far: a tale of two  $\alpha$ 's.* Monthly Notices of the Royal Astronomical Society, 451(2):1511. URL <http://dx.doi.org/10.1093/mnras/stv775> (2015)

**J Michael Burgess & Felix Ryde.** *Are GRB blackbodies an artefact of spectral evolution?* 447(4):3087. URL <http://dx.doi.org/10.1093/mnras/stu2670> (2015)

**Giacomo Vianello, et al.** *The Multi-Mission Maximum Likelihood framework (3ML).* page arXiv:1507.08343. URL <http://arxiv.org/abs/1507.08343> (2015)

- R Preece, et al.** *The First Pulse of the Extremely Bright GRB 130427A: A Test Lab for Synchrotron Shocks.* Science, 343(6166):51. URL <http://dx.doi.org/10.1126/science.1242302> (2014)
- J M Burgess, et al.** *Time-resolved Analysis of Fermi Gamma-Ray Bursts with Fast- and Slow-cooled Synchrotron Photon Models.* 784(1):17. URL <http://dx.doi.org/10.1088/0004-637X/784/1/17> (2014)
- J Michael Burgess, et al.** *An Observed Correlation between Thermal and Non-thermal Emission in Gamma-Ray Bursts.* The Astrophysical Journal Letters, 784(2):L43. URL <http://dx.doi.org/10.1088/2041-8205/784/2/L43> (2014)
- J Michael Burgess.** *On spectral evolution and temporal binning in gamma-ray bursts.* Monthly Notices of the Royal Astronomical Society, 445(3):2589. URL <http://dx.doi.org/10.1093/mnras/stu1925> (2014)
- M Axelsson, et al.** *GRB110721A: An Extreme Peak Energy and Signatures of the Photosphere.* The Astrophysical Journal Letters, 757(2):L31. URL <http://dx.doi.org/10.1088/2041-8205/757/2/L31> (2012)
- Adam Goldstein, et al.** *The Fermi GBM Gamma-Ray Burst Spectral Catalog: The First Two Years.* The Astrophysical Journal Supplement ..., 199(1):19. URL <http://dx.doi.org/10.1088/0067-0049/199/1/19> (2012)
- J Michael Burgess, et al.** *Constraints on the Synchrotron Shock Model for the Fermi GRB 090820A Observed by Gamma-Ray Burst Monitor.* The Astrophysical Journal, 741(1):24. URL <http://dx.doi.org/10.1088/0004-637X/741/1/24> (2011)
- Sylvain Guiriec, et al.** *Detection of a Thermal Spectral Component in the Prompt Emission of GRB 100724B.* The Astrophysical Journal Letters, 727(2):L33. URL <http://dx.doi.org/10.1088/2041-8205/727/2/L33> (2011)
- J Larsson, et al.** *Evidence for Jet Launching Close to the Black Hole in GRB 101219b—A Fermi GRB Dominated by Thermal Emission.* The Astrophysical Journal Letters, 800(2):L34. URL <http://dx.doi.org/10.1088/2041-8205/800/2/L34> (2015)
- M Ackermann, et al.** *Fermi-LAT Observations of the Gamma-Ray Burst GRB 130427A.* Science, 343(6166):42. URL <http://dx.doi.org/10.1126/science.1242353> (2014)