

## Sarah Bird's Curriculum Vitae

### **Permanent Address**

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## Education

**B.S. in Physics, minors in Mathematics and Spanish,**  
University of Missouri-Columbia, 3.643 cumulative GPA.

December 2007

## Work Experience

**Research Experience for Undergraduates,** University of Wyoming

May 2007-July 2007

Research conducted with Dr. Chip Kobulnicky, Georgi Chunev, and Brian Uzpen which included reducing (using IRAF) and classifying the optical spectra [3910 - 6660 Å] for 20 previously unclassified stars having 8 micron excess in the Spitzer GLIMPSE Point Source Catalog. Obtained with the Wyoming Infrared Observatory 2.3 m telescope and longslit spectrograph.

## Scientific Papers and Presentations

**American Astronomical Society 211<sup>th</sup> Poster Presentation,** Austin, Texas

9 January 2008

“Optical Spectroscopy of GLIMPSE Stars with 8 Micron Infrared Excesses.” To view this poster, please visit my web page <http://faraday.uwyo.edu/~sbird/Jan2007AAS.html>.

**Author of unpublished paper Dark Energy Versus Inhomogeneous Universe,** University of Missouri-Columbia

May 2007

To view a PDF, please visit my web page <http://faraday.uwyo.edu/~sbird>.

**Author of unpublished paper Antony Hewish and the Pulsar,** University of Missouri-Columbia

January 2005

To know more, please email me at [sab5w4@mizzou.edu](mailto:sab5w4@mizzou.edu).

**Author of unpublished paper Marie Curie and the 1903 Nobel Prize in Physics,** University of Missouri-Columbia

January 2005

To view a PDF, please visit my web page <http://faraday.uwyo.edu/~sbird>.

## Physics and Astronomy Activities

<b>Laws Observatory</b> , University of Missouri-Columbia Observations, during public viewings using the 16" Schmidt-Cassegrain Telescope, such as Comet 17P/Holmes, the transit of Mercury across the Sun, and the close to Earth orbit of Mars.	August 2003-present
<b>Physics Leaders' Meeting</b> , University of Missouri-Columbia Met University physics alumni and attended presentations of recent University physics research.	October 2007
<b>Observation of Total Lunar Eclipse</b> , Columbia, Missouri.	August 2007
<b>Wyoming Astro Camp</b> , Laramie, Wyoming Engaged Junior High School students in a week of first-hand astronomy experience through creative activities such as Mars rover hunt, parallax lab, science fiction writing, and more.	17-22 June 2007
<b>Physics Trip to Colorado</b> , Denver and Boulder, Colorado Visited National Institute of Standards and Technology and Laboratory for Atmospheric and Space Physics at the University of Colorado at Boulder.	May 2007
<b>Physics Open House</b> , University of Missouri-Columbia Devoted a day to opening the physics building to the community and allowing families to enjoy physics demonstrations, hands on experiments, and crafts such as make your own spectrometer.	Spring 2006 and 2007
<b>Observation of Comet McNaught</b> , Chesterfield, Missouri.	January 2007
<b>Participant during discussion on gravitational wave research</b> , California Institute of Technology, Pasadena, California Met gravitational wave researchers, Andrew Lange of California Institute of Technology and Paul Steinhardt of Princeton University, and participated in a discussion on their research.	Summer 2003

## Academic Recognition and Memberships

<b>Dean's List</b> , University of Missouri-Columbia.	All semesters 2003-2007
<b>Regular Attender of the Physics and Astronomy Club</b> , University of Missouri-Columbia A chapter of the Society of Physics Students.	September 2006-present
<b>Lifetime Member of Mizzou Alumni Association</b> , University of Missouri-Columbia.	September 2007-present
<b>Valedictorian</b> , Christian High School, O'Fallon, Missouri.	2003

<b>Science Student of the Year</b> , Christian High School, O'Fallon, Missouri.	2003
<b>Math Student of the Year</b> , Christian High School, O'Fallon, Missouri.	2003
<b>Lower Rower Award</b> , Christian High School, O'Fallon, Missouri An award for service, helpfulness, and humility.	2003
<b>Recognition of Achievement in Twelfth Grade English</b> , Christian High School, O'Fallon, Missouri.	2003

### Community Service

<b>Ronald McDonald House</b> , Columbia, Missouri Support families with a child battling cancer.	Fall 2007
<b>St. Louis Dream Center</b> , St. Louis, Missouri Participate in activities for the Dream Center, an organization devoted to serving urban communities.	Summer 2006-present
<b>Central Missouri Food Bank</b> , Columbia, Missouri Participate in activities with CMFB, a regional disaster and hunger relief network.	2003-present
<b>Step Forward Day</b> , Columbia, Missouri Served the local Columbia community alongside other students from University of Missouri-Columbia.	Fall 2003 and Fall 2004
<b>Caring for Columbia</b> , Columbia, Missouri Served the local Columbia community alongside other students from University of Missouri-Columbia.	Spring 2006 and Spring 2007
<b>Mission Gate</b> , Hazelwood and St. Louis, Missouri Participated in activities for Mission Gate, an organization which provides service to those in prison and recently released and encourages life without crime.	1999-2003
<b>Thirty Hour Famine</b> , Hazelwood and St. Louis, Missouri Fasted for thirty hours, cleaned a homeless shelter, and raised money for starving children worldwide.	Spring 2001

## Amateur Radio and Extracurricular Activities

<b>HAARP-LWA Moon Bounce Experiment</b> , Chesterfield, Missouri Attempted to receive radio signals bounced off the moon from the HF Active Auroral Research Program transmitter in Alaska. Experiment initiated by HAARP and the Long Wavelength Array in New Mexico.	20 January 2008
<b>Hold FCC License KC0YBW</b> , St. Charles, Missouri.	Summer 2006-present
<b>Own and Operate VHF Radio Transceiver.</b>	2006-present
<b>Operate HF Radio Receiver and HF Radio Transceiver</b> , Chesterfield, Missouri.	2006-present
<b>Member of St. Charles Amateur Radio Club</b> , St. Charles, Missouri.	2006-present
<b>Member of Discovery Ministries Canoe Challenge Wilderness Trip</b> , Current River, Missouri Canoed for a week with attention focused on challenges physically, emotionally, and spiritually.	Summer 2003 and 2002
<b>Outdoors Adventurer</b> , many sites worldwide Camping, hiking, rock climbing, swimming, canoing, horseback riding, mountain climbing.	childhood-present
<b>Travels</b> , United States, Mexico, Canada, Israel, Japan.	childhood-present

## Computer Experience

<b>Linux (Fedora Core)</b> , General Use and Programming.	
<b>Unix (Solaris)</b> , General Use.	
<b>Windows XP Pro</b> , General Use and Programming.	
<b>Mac OS X</b> , General Use.	
<b>Fortran</b> , Program Modification for Research of Comets under Dr. Aigen Li.	
<b>Visual Basic</b> , Program Development for class entitled Introduction to Problem Solving and Programming.	
<b>IRAF</b> , Data reduction during Research Experience for Undergraduates program in Wyoming.	
<b>IDL</b> , Programming for stellar spectra classification and for creation of spectral figures.	
Software Includes: <b>OpenOffice, StarOffice, Word, Excel, PowerPoint, HTML, Mathematica, FTP, SFTP, TELNET,</b>	

SSH, Emacs, vi, Mozilla, Firefox, Internet Explorer.

### **Instrumentation Experience**

**Electronic:** Oscilloscope, Frequency Generator, VTVM and DVM.

**Communications:** HF Receiver, HF Transceiver, VHF Transceiver.

**Optical:** Wyoming Infrared Observatory 2.3 m Cassegrain Telescope and Longslit Spectrograph; University of Missouri-Columbia Laws Observatory 16" Schmidt-Cassegrain Telescope; Eight Inch Newtonian Telescope with manual setting circles; prism, grating, and UV-VIS Spectrometers; Spectrofluorometer; Michelson and Fabry-Perot Interferometers; Polarizers and Retardation Plates; Fresnel Biprism; Traveling Microscope.

**Shop:** Soldering, Drill Press.

### **Foreign Language**

**Proficient in Spanish**, including speaking, writing, and listening.

### **Course Content Information from Undergraduate School at University of Missouri-Columbia**

Class Title

Description

Professor

Book Title and Author

Upper level science courses:

Introduction to Modern Physics

Relativistic kinematics and Lorentz transformations; historical basis for quantum mechanics; atomic structure; physics of solids; nuclear structure and decay.

Suchi Guha

*Modern Physics for Scientists and Engineers* by Taylor, Zafiratos and Dubson

Mechanics

Development of fundamental concepts, principles of mechanics using mathematical methods. Many problems used.

Suchi Guha

*Classical Dynamics of Particles and Systems, Fifth Edition* by Thornton and Marion

Electricity and Magnetism I

Mathematical preliminaries, properties of charge distributions at rest and in motion, the field concept, introduces electromagnetic radiation.

Shi-Jie Chen

*Introduction to Electrodynamics, Third Edition* by David J. Griffiths

### Introduction to Thermodynamics

Development of the concepts of temperature, heat, work, entropy, enthalpy and free energy. Applications to gases, liquids and solids. Statistical methods.

Shi-Jie Chen

*Fundamentals of Statistical and Thermal Physics (McGraw-Hill Series in Fundamentals of Physics)* by Frederick Reif

### Light and Modern Optics

Interaction of light with matter, spectroscopic techniques, wave optics, interferometry, multilayer films, polarization, non-linear optics, design of optical instruments, matrix methods, waveguides, fiber optics, acousto-optic and photo-elastic modulation. Includes both lectures and laboratory.

Ping Yu

*Introduction to Optics* by Frank L. Pedrotti and Leno S. Pedrotti

### Stellar Astrophysics

Basic astrophysics of stable and unusual stars, stellar systems. Investigates stellar dimensions, radiation, spectra, energy, evolution, populations; interstellar medium, stellar motions and aggregation.

Angela Speck

### Introduction to Quantum Mechanics I

Foundations of wave mechanics; wave packets; Schrodinger equation and I-D problems; operators and eigenfunctions, spherically symmetric systems.

Shufeng Zhang

*Introduction to Quantum Mechanics Second Edition* by David J. Griffiths

### Introduction to Modern Astrophysics

Elements of stellar, and galactic astrophysics. Interpretation of observations and physical conditions of various astronomical objects including stars, gaseous nebulae and, galaxies.

Angela Speck

### Modern Physics

A capstone course in physics that will involve the sequential development of one major paper of length 25-30 pages. The subject of the paper will be in some area of physics in which faculty in University of Missouri-Columbia's Physics and Astronomy department have expertise. The subject will involve a physical phenomenon or phenomena of current interest and for which a general consensus has not been reached as to its interpretation. That is, there may not be a theory proposed or there may be conflicting theories. There may also be inconclusive or conflicting experimental results.

Haskell Taub

No text book

### Solar Systems Science

Investigates physical states, interior structures and comparative geology of solar system bodies: planets, moons, asteroids, comets, sun. Solar system formation and evolution.

Angela Speck and Alan Whittington

*Moons and Planets*, Fifth Edition, by William K. Hartmann

### Undergraduate Research in Astronomy and Physics

Research involving comets, specifically Hale-Bopp, and using Fortran to model the dust production rates with particular attention paid to mm or cm-sized large grains.

Aigen Li

No text book

Upper level mathematic courses:

Analytical Geometry and Calculus I

Elementary analytic geometry, functions, limits, continuity, derivatives, antiderivatives, definite integrals.

Bill Banks

*Single Variable Calculus*, Fifth Edition by James Stewart

Calculus II

Definite integrals, applications and techniques of integration, elementary transcendental functions, infinite series.

Catalin Ciuperca

*Single Variable Calculus*, Fifth Edition by James Stewart

Calculus III

Vectors, solid analytic geometry, calculus of several variables.

Elias Saab

*Multivariable Calculus*, Fifth Edition by James Stewart

Differential Equations

Traditional introductory course in ordinary differential equations. Includes 1st and 2nd order linear differential equations with numerous applications; Laplace transforms; power series solutions; numerical methods, linear systems.

Shuguang Wang

*Elementary Differential Equations*, Seventh Edition, Course Advantage Edition, by William E. Boyce and Richard C.

DiPrima

Matrix Theory

Basic properties of matrices, determinants, vector spaces, linear transformations, eigenvalues, eigenvectors, and Jordan normal forms. Introduction to writing proofs.

Hema Srinivasan

*Linear Algebra with Applications* by Steven Leon

Applied Analysis

Solution of the standard partial differential equations (wave, heat, Laplace's eq.) by separation of variables and transform methods; including eigenfunction expansions, Fourier and Laplace transform. Boundary value problems, Sturm-Liouville theory, orthogonality, Fourier, Bessel, and Legendre series, spherical harmonics.

Stephen Montgomery-Smith

*Partial Differential Equations with Fourier Series and Boundary Value Problems*, Second Edition by Nakhle Asmar