Brent Mode

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EDUCATION

University of Wisconsin
Madison, WI
PhD Physics, in progress, 2018 - Present
Advisor: Justin Vandenbroucke
Research: Development and Commissioning of a Dual-Mirror Schwarzschild-Couder Telescope for the Cherenkov Telescope Array

University of Louisville
Louisville, KY
Bachelors of Science, May 2018
Majors: Physics, Mathematics
summa cum laude (GPA: 3.98/4.00)

HONORS and AWARDS

Outstanding Graduating Senior ($800), Phi Beta Kappa Association of Kentuckiana, 2018
Donald M. Bennett Fellowship ($500), University of Louisville Physics Department, 2018
NSF Graduate Research Fellowship Program, Honorable Mention, 2018
NSF Research Experience for Undergraduates (REU) participant at University of Michigan, 2017
Barry M. Goldwater Scholarship, Honorable Mention, 2017
James J. Drautman Fellowship ($1000), University of Louisville Physics Department, 2017
NSF REU participant at Purdue University, 2016
Sigma Pi Sigma ($\Sigma\Pi\Sigma$), Member, 2016 – Present
James J. Drautman Fellowship ($3000), University of Louisville Physics Department, 2016
Robert J. Bickel Scholarship in Mathematics ($3000), University of Louisville, 2016
P.J. Ouseph Fellowship ($500), University of Louisville Physics Department, 2015
University of Louisville Honors Program, Honors Scholar, 2015 – Present
Trustees Scholar ($74,016), University of Louisville, 2014 – Present
National Merit Scholarship Competition, Finalist, 2014
Eagle Scout Award, 2009

RESEARCH EXPERIENCE

University of Wisconsin
Development and Commissioning of a Dual-Mirror Schwarzschild-Couder Telescope for the Cherenkov Telescope Array, 2019 - Present

- Characterization of prototype front-end electronics module for prototype Schwarzschild-Couder Telescope (pSCT) camera upgrade
- Analysis of preliminary data for pSCT
- Real time support of onsite data taking efforts
- Performance of observing duties, including night sky and calibration data
- Investigation of temperature dependence in onsite data

University of Michigan
Efficiency of Universal Quantum Gate Sets for Quantum Computing, 2017 - 2018

- Performed numerical calculation of average approximation efficiency of various common universal quantum gate sets using an implementation of Solovay-Kitaev algorithm
- Investigation of analytic techniques to improve bounds on efficiency measure of certain commonly studied choices of universal quantum gate set
- Research presented at NSF Research Experiences for Undergraduate (REU) symposium at University of Michigan
- Computational efforts culminated in senior thesis at University of Louisville

Purdue University
Improvement of Liquid Xenon TPC for Research and Development, 2016

- Upgraded test sensors for small LXe TPC, including fabrication of simple level sensor
- Integration of collaboration DAQ software with local hardware
- Improvement of system design
- Research presented as talk at Purdue University NSF REU symposium

University of Louisville
High Energy Physics Experimentation with Mu2e, 2016 - 2018

- Simulation of radiative pion capture (RPC) background using Fermilab computing resources
- Helped more junior undergraduates integrate into group activities by creating documentation and training resources
- Reported on the plausibility of Mu2e being sensitive to hypothesized dark photon decay signals
- Implemented updates to simulation of Mu2e facility geometry
- RPC background simulations presented as two posters at University of Louisville Undergraduate Research Symposium and Mu2e internal report

Photonic Methods for Measuring Biological Redox Reactions, 2014 - 2015

- Trained on optical laboratory equipment such as oscilloscope, solid-state laser, atomic deposition device, etc
- Investigated issues with integrated optical wave guide mounting system

TEACHING EXPERIENCE

Graduate Teaching Assistant, University of Wisconsin, 2018
Physics in the Arts

Undergraduate Teaching Assistant, University of Louisville, 2016 - 2018
Introduction to Electricity, Magnetism, and Light
Fundamentals of Physics - Mechanics
Classical Mechanics (Upper Level)
Differential Equations in Physics
Introductory Mechanics Lab

Tutor, University of Louisville, 2015
Fundamentals of Physics - Mechanics
Fundamentals of Physics - Electricity and Magnetism
Introduction to Electricity, Magnetism, and Light

Volunteer Physics Instructor, Jeffersonville High School, 2016 (intermittent)
AP Physics I & II

- Lectured on new topics in high school physics curriculum and helped students understand problem sets
- In response to learning that the assigned instructor had no physics experience

MENTORING EXPERIENCE

Robijn "Ruby" Kleijwegt, UW Madison undergraduate student, 2019 - present: *Characterization of a prototype front-end electronics module for CTA pSCT*

EXTRA-CURRICULAR AFFILIATIONS

Elected Mentoring Chair, Physics Graduate Student Council, University of Wisconsin, 2019 - Present
Volunteer, Various UW Physics Outreach Efforts, 2018 - present
Member, Madison Brass Band, 2019 - Present

Elected *President, Treasurer*, Society of Physics Students, University of Louisville, 2016 - 2018
Member, Society for Women in Physics and Astronomy, University of Louisville, 2016 - 2018
Member, Commonwealth Brass Band, 2015 - 2018

CONFERENCE PROCEEDINGS

C. Adams et al., *Camera design and performance of the prototype Schwarzschild-Couder Telescope for the Cherenkov Telescope Array*, in *36th International Cosmic Ray Conference (ICRC 2019) Madison, Wisconsin, USA, July 24-August 1, 2019*, 2019, 1910.00133

C. Adams et al., *Prototype Schwarzschild-Couder Telescope for the Cherenkov Telescope Array: Commissioning Status of the Optical System*, in *36th International Cosmic Ray Conference (ICRC 2019) Madison, Wisconsin, USA, July 24-August 1, 2019*, 2019, 1909.11403

C. Adams et al., *Development and operations of INFN optical modules for the SCT Telescope camera proposed for the Cherenkov Telescope Array Observatory*, in *36th International Cosmic Ray Conference (ICRC 2019) Madison, Wisconsin, USA, July 24-August 1, 2019*, 2019, 1909.08361

C. Adams, G. Ambrosi, M. Ambrosio, C. Aramo, W. Benbow, B. Bertucci et al., *Characterization and assembly of near-ultraviolet SiPMs for the Schwarzschild-Couder medium-size telescope proposed for the CTA Observatory*, in *Hard X-Ray, Gamma-Ray, and Neutron Detector Physics XXI*, R. B. James, A. Burger and S. A. Payne, eds., vol. 11114, pp. 52 – 60, International Society for Optics and Photonics, SPIE, 2019, DOI