

# Forty-Ninth Annual Arkansas Junior Science And Humanities Symposium

In Cooperation With

U.S. ARMY RESEARCH OFFICE  
Research Triangle Park, NC

U.S. OFFICE OF NAVAL RESEARCH  
Arlington, VA

U.S. AIR FORCE OFFICE OF SCIENTIFIC RESEARCH  
Bolling AFB, Washington DC

## LOCAL SPONSORS

THE ARKANSAS ACADEMY OF SCIENCE

LA QUINTA INN OF RUSSELLVILLE  
Russellville, AR  
POSEY PRINTING COMPANY  
Russellville, AR  
ARKANSAS TECH UNIVERSITY  
Russellville, AR

## OBJECTIVES

- To promote research and experimentation in the sciences, mathematics, and engineering at the high school level.
- To recognize the significance of research in human affairs, and the importance of humane and ethical principles in the application of research results.
- To search out talented youth and their teachers, recognize their accomplishments at symposia and encourage their continued interest and participation in the sciences, mathematics, and engineering.
- To expand the horizons of research-oriented students by exposing them to opportunities in the academic, industrial, and governmental communities.
- To increase the number of future adults capable of conducting research and development.

## Program

All rooms are located on the main campus of Arkansas Tech University

### FRIDAY, MARCH 13, 2015

12:30 pm **Registration, McEver Hall Lobby**  
Bus parking is available in the Tucker  
Coliseum lot across from the East entrance to  
Doc Bryan

1:00—4:15 pm **Demonstration Tours:**  
Tours will assemble in the McEver lobby

**Demonstration #1: Radiation-It's all Around Us**  
Corley 270 **Mr. Stanton C. Apple—Mechanical Engineering**

*Many everyday objects emit small amounts of radiation. In this exercise, students will get a chance to see some common radiation detection and counting equipment, determine whether common objects emit detectable amounts of radiation and examine other aspects of radiation encountered in daily life.*

**Demonstration #2: Senior Design Projects from High Powered Rocketry to High Power Electricity**  
Corley 114A **Dr. Daniel Bullock, PhD, Electrical Engineering**

*Presentation will highlight some of the fun and interesting senior design projects mentored by Dr. Bullock*

**Demonstration #3: Power System Operation with Smart Grid Technology**  
Corley 269 **Dr. Zhi Chen, Ph. D, Electrical Engineering**

*The presentation will highlight some key issues with the design and basic operation of electric power systems, the role of recent innovations of smart grid applications to the area of power and energy will also be discussed.*

**Demonstration #4: Solar Energy Experiment: Thermal and Photovoltaic**  
Corley 128 **Dr. Wayne Helmer, PhD, Mechanical Engineering**

*Participants will perform an experiment using Solar Energy: Thermal and Photovoltaic.*

**Demonstration #5: Mercury Robot Challenge and Robot Building**  
Corley 114B **Dr. Yung Lee, PhD and Mr. Jacob Weidenfeller, Electrical Engineering**

*The presentation will cover general guidelines of the Competition with detailed rules and how our senior design project team has been building a robot to win the competition, which includes detailed techniques of controls, communications, manufacturing, etc.*

4:30 pm **Meeting of All Delegates, Doc Bryan Auditorium**  
A meeting of all teachers and delegates with the director in order to go over policies and procedures.

5:15 pm **Return to Hotel (La Quinta Inn of Russellville)**

6:30 pm **Recognition Banquet, Chambers Cafeteria**  
Introductions: Dr. Tackett, Director Arkansas JSHS  
Welcome: Dr. Robertson, Dean ATU Nat. & Health Sci.  
Recognition of Papers: Dr. Yamashiata, Assoc. Prof. of Bio.  
Certificates: Dr. Kellner, Prof. of Wildlife Bio.

8:00 pm **Keynote Speaker,**  
9:15—11:00 pm **Return to Hotel for Pizza Party and Swimming**  
La Quinta Inn of Russellville

### SATURDAY, MARCH 14, 2015

6:15—7:45 am **Breakfast, La Quinta Inn of Russellville**  
Students not presenting papers should be checked out before leaving the hotel for the paper presentations. Paper presenters and sponsors will have until 1:00 pm to check out.

8:00 am **Presentation of Student Papers, Doc Bryan Auditorium**  
Moderator: Dr. Jackie Bowman Assoc. Prof. of Bio. ATU

11:30—12:30 am **Lunch, Chambers Cafeteria**

12:00—1:00 pm **\* Poster Setup, 300 Pendergraft Lib. & Technology Center**

1:00—2:30 pm **Judging of Posters, 300 Pendergraft Lib. & Tech. Ctr.**  
Head Judge: Dr. Jim Musser, Assoc. Prof. of Physics ATU

2:45—3:45 pm **JSHS Cabaret, Doc Bryan Auditorium**  
Performed by the ATU Music Theater Workshop under the direction of Mr. Kenneth Futterer, Associate Professor of Music at Arkansas Tech University

4:00—4:30 pm **Program Evaluation, Doc Bryan Auditorium**

4:30—5:00 pm **Awards Presentations, Doc Bryan Auditorium**  
Announcement of Arkansas JSHS paper and poster contest winners.  
Announcement of the JSHS Teacher Award

5:00 pm **Adjournment**  
There are no arrangements for dinner, you are free to leave.

## Judges

### Head Judges

Dr. Chris Kellner, Head Paper Judge, Professor of Wildlife Biology, ATU  
Dr. Jim Musser, Head Poster Judge, Assoc. Professor of Physics, ATU  
Head of the Department of Physical Sciences, ATU

### Paper Judges Panel

Dr. Robert Allen, Professor of Chemistry, ATU (Retired)  
Dr. Dan Bullock, Assoc. Professor of Electrical Engineering, ATU  
Dr. Cathy Baker, Professor of Geology, ATU  
Dr. Carl Greco, Assoc. Professor of Electrical Engineering, ATU  
Dr. David Osburn, Assoc. Professor of Psychology, ATU  
Dr. Hamed Shojaei, Asst. Professor of Physics, ATU  
Dr. Ivan Still, Assoc. Professor of Biology, ATU  
Dr. Bruce Tedford, Assoc. Professor of Biology, ATU  
Dr. Tsunemi Yamashita, Assoc. Professor of Biology, ATU

## Planning

### Arkansas Tech University Planning Committee

Dr. Jacqueline Bowman, Assoc. Professor of Biology  
Mrs. Cheryl Chaney, Asst. Professor of Biology  
Dr. Cindy Jacobs, Asst. Professor of Biology  
Dr. Jim Musser, Assoc. Professor of Physics and Head of ATU Physical Sciences  
Dr. Jeff Robertson, Professor of Astrophysics and Dean ATU Nat. & Health Sci.  
Dr. Amber Sierra, Asst. Professor of Physics

### Director, Arkansas Junior Science & Humanities Symposium

Dr. Jessica Conry Young, Asst. Professor of Physics, Arkansas Tech University



## Speaker



### Dr. Benjamin Newton

Research Electronics Engineer  
Air Force Research Lab at Wright Patterson Air Force Base.

## STEM and Armed Forces

A student obtaining a degree in a STEM field does not need to wonder about the availability of employment within the armed forces. The student would benefit more by narrowing down the possibilities to what he or she is most interested in accomplishing. The STEM disciplines are employed by all of the armed forces in STEM specific jobs and non STEM jobs that have a need for the analytical acumen of STEM students. One of the most valuable tools a STEM graduate will need to employ after graduation is knowing their skillset and being open minded and creative about the application of that skillset to gain and retain employment after graduation. Dr. Benjamin Newton will present examples of exciting opportunities that are available in the armed forces for people with a STEM background and how to take advantage of these opportunities to further your professional goals.

Dr. Benjamin Newton started his STEM career serving as an electronics technician in the United States Navy for six years. He then attended the University of Arkansas at Pine Bluff and received a Bachelor of Science in Physics in 2009. While obtaining his undergraduate degree he worked weekends utilizing his electronics technician skills for Diebold an automated teller company and was a math and science tutor for athletes. He went on to attend the University of Arkansas Fayetteville to receive his master and doctoral degree in Microelectronics and Photonics in 2014. He has written and co-written several conference papers in the field of thin film photovoltaics. His dissertation work included utilizing molecular beam epitaxy to create a new composite material for thin film amorphous silicon solar cells. He is currently a Research Electronics Engineer for the Air Force Research Lab at Wright Patterson Air Force Base. He hopes to build a great career with the Air Force and one day invent something great which he is currently working on in his garage.



## 49<sup>th</sup> Annual Arkansas Junior Science & Humanities Symposium



[www.atu.edu/jshs](http://www.atu.edu/jshs)



[www.jshs.org](http://www.jshs.org)



March 13-14, 2015  
ARKANSAS TECH UNIVERSITY  
Russellville, AR 72801