

# Goals

- Promote the history of African Americans in the physical sciences
- Provide resources for history and science teachers to be able to utilize in their classrooms and in outreach in a fun and engaging way.

# Framing

- Background reading into the history of science
- Methodology and perspective integral to pedagogical content
- Incorporate new paradigms of sociological perspective
  - Crucial for our comprehension, incorporation, and communication
- Mindful and intersectional final products
  - Lesson Plans
  - Annotated Bibliography
- Intersectionality
  - Race, gender compound one another
  - Not separate concepts
  - Formative aspects of a person's life experiences
- Common Core and Next Generation Science Standards (NGSS) integration into lesson plans

# The Teacher's Guide

1. ~ 25 Lesson Plans
2. Handouts profiling prominent African American Physicists and institutions
3. Annotated Bibliography
4. List of Notable African Americans in the Physical Sciences compiled from our own research and websites such as [Physicists](#) and [Astronomers](#) of the African Diaspora (Dr. Scott Williams at SUNY University at Buffalo)
5. Guide to Online Resources such as blogs, websites, and databases
6. Trivia Card Game
7. Biographical Sketches
8. HBCUs and Physics Spreadsheet/Table

# The Process

- Preliminary Research
  - Look at sources given to us by the Library Staff and Dr. Good
  - Use these sources to look for other sources



- Finding Recurring Themes



- Brainstorming
  - What kind of materials do we want to create for the guide?



- Creation of Materials
  - Prioritize work based on what we wanted to get done first

# Source Evaluation

- Source evaluation sheets completed for all resources
- Used for annotated bibliography
  - What is this source?
  - Where can this source be found?
  - Is the source useful?
  - Why is it useful?
- Easily digestible for teachers
- Citation, format, keywords, notes, and summary

Source Evaluation Form  
Women & Minorities in Physics, Astronomy and Related Disciplines  
Center for the History of Physics

Citation:	Ong, Maria. "Body Projects Of Young Women Of Color In Physics: Intersections Of Gender, Race, And Science." <i>Social Problems</i> : 593-617.
Format:	Print (article)
Keywords:	Intersectionality, passing,
Notes:	<ul style="list-style-type: none"><li>- 594 Most research on women in science is on white women in science</li><li>- 594 Ong's goal is to dive into the void left by this trend</li><li>- 597 Notion of ordinariness as "achievement...to claim the nature and benefits of membership in a particular community"</li><li>- 597 white male presence in science is the historical centerpiece of celebration</li><li>- 597 Women of color often put aside their complex identities in order to compete with domination of white males in scientific communities</li><li>- 598 science is not culturally neutral</li><li>- 598 "Burden of bearing standards not necessarily designed for them"</li><li>- 599 femininity affects perception of competency</li><li>- 599 additional burdens to women of color in science when they are framed as speaking for all members of a certain group, while whites are afforded the ability to speak as individuals</li></ul>

# Brainstorming

- Needed to figure out what would be included in our teachers guide
  - Lesson Plans
  - Other Materials
- Asked ourselves: What kind of lessons do we want to create?
  - Discussed a number of factors:
    - What each team member researched
    - What kinds of themes we uncovered
    - How can the lesson apply to either a physics or history classroom in a meaningful and effective way?
- Find a way to make each part of the guide fun and engaging rather than overloading students and teachers with information

# Lesson Plans

## Jake

- Not Your Average Physicist - A look at Physicists who are in other fields of Science
- Student Protests of the 1960's at Fisk- Case Study of James Raymond Lawson
- African Americans in Astronomy- From Benjamin Banneker to the Present and Beyond
- Military influence of African Americans in the Physical Sciences
- Arts, Athletics and Physics- A look at involvement outside of Science

## Simon

- When Computers Wore Skirts: Katherine G. Johnson
- Contributions to NASA and Space Exploration
- African-American Firsts in Physics and Astronomy
- Early 2000s Spike in African-American Ph.D.'s
- Case Study: Shirley Ann Jackson
- Origins of the National Society of Black Physicists

# More Lesson Plans!

## Serina

- Edward Bouchet and the Washington-Du Bois Debate over African American Education
- Edward Bouchet and African American Life in New Haven, Connecticut
- African Americans and the Manhattan Project
- “The Physicist’s War”: Dr. Herman Branson and Howard University during World War II
- The “Tuskegee Weathermen:” Black Meteorologists in World War II
- Physicist Activist: Dr. Elmer Imes and the Civil Rights Case of Juliette Derricotte

## Sharina

- Physical Sciences at HBCUs
- The Scientific Renaissance of the 1970s: The Bell Labs
- Creating Your Own Spectrometer: Dr. Elmer Imes’s Life’s Work
- Dr. James West and the Physics of Sound
- Dr. Willie Hobbs-Moore...Dr. Shirley Ann Jackson...And You!
- Dr. Sylvester James Gates and the Quest to Find Out How Nature Works



# Other Materials

## PHYSTORY

Elmer Samuel Ives becomes the second African American to receive a Ph.D. in Physics from the University of Michigan.

1918

## PHYSTORY

Inventor Garrett Augustus Morgan patents the three-position traffic signal.

1923

## PHYSTORY

Physicist Meredith "Flash" Gourdine won the silver medal in the men's long jump at the Helsinki Summer Olympics. Gourdine was a pioneer in the research of electrogasdynamics.

1952

## PHYSTORY

"Human computer" Katherine Johnson calculates the trajectory for the flight which put Alan Shepard in space, making him the first American to go to space.

1959

## PHYSTORY

Dr. James West patents the modern day microphone (officially known as the Electroacoustic Transducer Electret Microphone) along with Gerhard Sessler.

1962

## PHYSTORY

The National Society of Black Physicists (NSBP) is established. NSBP is the largest and most recognizable organization devoted to the African American physics community.

1977

## PHYSTORY

Reva Williams becomes the first African American woman to earn her Ph.D. in Astrophysics from Indiana University. Dr. Williams was the first person to successfully work out the Penrose Mechanism for extracting energy from a black hole.

1991

# Other Materials

CENTER FOR HISTORY OF PHYSICS | SUMMER 2014  
**Edward Bouchet**  
 THE FIRST AFRICAN AMERICAN DOCTORATE, PHYSICIST, EDUCATOR

"His name belongs among the pioneers of Afro-American science and education for the part he played as a role model and inspiration to hundreds of students who sat in his classroom or worked in his laboratory." — Ronald Mickens

## A Pioneer in Science and Education

Edward Alexander Bouchet was born on September 15, 1852 in New Haven, Connecticut to William Frances and Susan Cooley Bouchet. He was the first boy and youngest child of the Bouchet family, with three older sisters. His father, William Bouchet, migrated to New Haven from South Charleston, South Carolina in 1824. He was the valet of a young plantation owner named John B. Robertson, the father of the well-known judge A. Heaton Robertson. Upon his graduation, John Robertson manumitted (freed) William Bouchet and gave him some money to start a business. His mother was born in Westport, Connecticut in 1817 to Asher and Jane Drake Cooley. She was a housewife and lived to be 103 years old, outliving her husband and Edward.



Edward A. Bouchet, New Haven, Connecticut



The American Institute of Physics' Center for History of Physics works to preserve and make known the historical record of modern physics and allied sciences. Through documentation, archival collections and educational initiatives, the Center ensures that the heritage of modern physics is safeguarded and its story is accurately told. The "Teachers Guide to the History of African Americans in the Physical Sciences" is part of an initiative to increase knowledge on the history of women and minorities in the physical sciences.



Edward Bouchet later in life.

## African American Life in New Haven, Connecticut

The life of the Bouchet family reveals much about the African American community in nineteenth century New Haven, which consisted of about 1,000 people. The Boucquet lived at 42 Bradley Street and later 94 Bradley Street in the majority African American area of New Haven. During his early years, Edward attended the African Street Colored School, the first school for African Americans in New Haven, founded in 1811, located at the corner of Asian and Court Streets. The school was a one-room schoolhouse with one teacher, Ms. Sally Wilson. Ms.

Wilson nurtured Edward's early academic abilities and interest and was an important figure in his life.

The Boucquets were also members of the Temple Street Congregational Church, the earliest Black church in New Haven, where William Bouchet served as deacon. Temple Church served as a stopping point for fugitive slaves along the Underground Railroad in the early nineteenth century and is an important historic institution of the African American community in New Haven.

## A Master Teacher

Bouchet completed his Ph.D. at Yale in 1876, writing his dissertation on "Measuring Refractive Indices." Bouchet's academic background should have made him a member of the nineteenth century scientific elite. However, racism and increasingly strict racial segregation in the nineteenth century meant that finding a position as a researcher or professor at a white institution was impossible.

Instead, Bouchet went on to teach the lives of hundreds of students at the many schools opening for African Americans following the Civil War which would become the nation's historically Black Colleges and Universities (HBCUs). He spent 26 years as a science instructor at the Institute for Colored Youth, now known as

Cheyney University in Philadelphia, the oldest HBCU in the country.

Bouchet resigned from the ICY in 1902 and went on to hold a number of positions around the country over the next 14 years of his life. He relocated to St. Louis, Missouri in 1902 where he taught physics and mathematics at Sumner High School and was business manager at Provident Hospital. From 1905 to 1908, he was director of academics at St. Paul Normal and Industrial School in Lawrenceville, Virginia. He joined the faculty at Bishop College in 1913 and then moved back to New Haven in 1916 due to illness where he passed away in his childhood home in 1918 at the age of 66.

## Honoring Bouchet's Legacy

Edward Alexander Bouchet leaves behind a powerful legacy. His memory lives on in the awards and scholarships provided in his name to underrepresented minorities in physics.

The American Physical Society, the world's second largest professional organization of physicists, established the Edward A. Bouchet Award in 1994 for underrepresented minority physics researchers.

The Edward Bouchet [Abdus Salam](#)

Institute was founded in 1983 by Nobel laureate Professor Abdus Salam and the National Society of Black Physicists to facilitate interaction between African and African American physicists.

The Promising Scholars Fund Edward A. Bouchet scholarship was established by the Sigma Pi Phi Fraternity of New Haven, Connecticut to assist academically talented African American graduates of New Haven high schools.



Edward Bouchet spent the majority of his career at the Institute for Colored Youth, now called Cheyney University. The Institute was founded as the African Institute by Quakers in Philadelphia, Pennsylvania in 1837.

Bouchet taught chemistry and physics at the Institute without the benefit of a license any. The principles of ICY was renowned advocate for African American education. Fanny Jackson Coppin.

In the late nineteenth century, the Institute began to transition to an institution mode of education spearheaded by Coppin.

## RESOURCES

Ronald E. Mickens, *Edward Bouchet: The First African American Doctorate*, River Edge, NJ: World Scientific Publishing, Co., 2002

For more lesson plans:



## African Americans in Physics, Astronomy, and the Related Sciences: An Annotated Bibliography

Alagna, Magdalena. *Mae Jemison: The First African American Woman in Space*. New York: Rosen Central, 2004.

This short biography (112 pages, small format, large print) is part of the Women Hall of Famers in Mathematics and Science series and is appropriate for readers at grade level 4-8. It highlights the life of Mae Jemison, the first African American female astronaut discussing her upbringing, why she pursued a career as an astronaut, her time in the Peace Corps and her career at NASA. The book contains great photographs and is colorful and visually appealing. It also contains a two-page timeline of Jemison's life, a glossary of scientific terms, and information on further reading and other resources.

Blue, Rose, Corinne J. Naden, and Don Tate. *Ron's Big Mission*. New York, NY: Dutton Childrens Books, 2009.

This children's book, intended for children in grades 1-3, tells the story of famous astronaut and physicist Ronald McNair. When he was nine years old, he walked into a library searching for books on being a pilot but was met with racial discrimination from the librarian. The story describes how McNair became an astronaut against the odds. With beautiful illustrations by Don Tate, this book would be a great read during class-time or an addition to an elementary school library.

Burns, Khepra and William Miles. *Black Stars in Orbit: NASA's African-American Astronauts*. San Diego: Harcourt-Braed, 1995.

This 80-page, over-sized volume illustrates the history of African American astronauts and is intended for readers at grade level 3-6. The book begins with a chapter on the Tuskegee airmen and links the history of African American pilots to astronauts. It documents how African Americans have faced racial discrimination and segregation and the work of African American scientists and who worked behind the scenes. The book is full of pictures and is written in an exciting and engaging way.

Campbell Jr., George, Ronni Denes, and Catherine Morrison. *Access Denied: Race, Ethnicity, and the Scientific Enterprise*. New York: Oxford University Press, 2000.

This anthology, which came out of the National Action Council for Minorities in Engineering (NACME) Research and Policy Conference on Minorities in Science, Engineering and Mathematics in 1995, gathers essays by over two dozen leading scholars and researchers that address the issue of underrepresented minorities in the sciences. The book begins with a demographic framework and ends with policy recommendations to increase the number of underrepresented minorities in the sciences. Particular essays

# Other Resources

Name	Gender	Birthplace	Date of Birth	Date of Death	Field	Bachelors
Adesida, Ilesanmi	Male	Nigeria		1949 n/a	Nanotechnology	UCLA, Berkeley
Adeyemi, Olusegun A.	Male	Nigeria				University of Lagos
Adkins, Rodney	Male	Miami, Florida		8/23/1958 n/a	Electrical Engineering	Rollins College/Georgia Tech
Akins, Daniel	Male	Miami, Florida		7/8/1941 n/a	Physical Chemistry	Howard University
Akins, Sondra	Female	Winston Salem, NC		3/16/1944 n/a	Science Education	UCLA, Berkeley
Alcorn, George E.	Male	Indianapolis, IN		3/22/1940 n/a	SemiConductors/Aerospace	Occidental College
Alexander, Claudia	Female	Canada/Santa Clara, CA		3/17/1905 n/a	Planetary Science	UCLA, Berkeley
Alexander, Stephon Haigh-Solom	Male	Trinidad/Bronx, N.Y.		n/a	Theoretical Physics	Haverford College
Allotey, Francis Kofi Ampemnyin	Male	Ghana		4/15/1905 n/a	Spectroscopy	London Imperial College
Anderson, Charles Edward	Male					
Anderson, Denise Brown	Female				Optics	
Anderson, Gloria Long	Female	Altheimer, Arkansas		11/5/1938 n/a	Chemistry	Arkansas A&M and Normal Colle
Antoine, Albert	Male	New York, NY		1/14/1925 n/a	Chemistry	City College of New York
Assamagan, Ketevi Adikie	Male	Port-Gentil, Gabon		3/15/1963 n/a	Nuclear and Particle Physics	University of Benin
Atkins, Rutherford H.	Male	Alexandria City, VA		11/21/1924	2/6/1998 Physics	Virginia State University
Austin, Wanda	Female	New York, NY		9/8/1954 n/a	Aeronautical Engineering	Franklin and Marshall College
Avery, Stephen	Male			5/29/1905	Experimental Nuclear Physics	Millersville University
Babalola, Stephen	Male	Nigeria			Nuclear Physics	
Baccouche, Aziza	Female			n/a	Theoretical Nuclear Physics	
Bagayoko, Diola	Male	Mali, West Africa		12/12/1948 n/a	Solid State Physics	Ecole Normale Superieure
Baker, Oliver Keith	Male	McGehee, Arkansas		n/a	Experimental Nuclear Physics	MIT
Banks, Harvey	Male	Atlantic City, NJ		2/7/1923	1979 Astronomy	Howard University
Banneker, Benjamin	Male	Baltimore, Maryland		11/9/1731	10/25/1806 Astronomy, Mathematics	None
Barnes, Sharon	Female	Beaumont, Texas		11/28/1955 n/a		Baylor University
Basri, Gibor	Male	New York, NY		5/3/1951 n/a	Astronomy	Stanford University
Bastien, Fabienne	Female	Maryland		n/a	Astronomy	University of Maryland, College
Bates, Clayton W., Jr.	Male	New York, NY		9/5/1932 n/a	Electrical Engineering	Manhattan College
Bennett, Valerie	Female			n/a	Robotics	Vanderbilt University
Best, Jason	Male			n/a	Astronomy, Astrophysics	Indiana University
Biggall, Orville Newton	Male					
Billign, Solomon	Male	Dessie, Ethiopia		n/a	Theoretical Physics	Addis Ababa University (Ethiopi
Blakeslee, Pamela	Female				Condensed Matter Physics	
Bluford, Gulon, S. "Guy", Jr.	Male	Philadelphia, PA		11/22/1942 n/a	Aerospace Engineering	Pennsylvania State University
Bolden, Charles F., Jr.	Male	Columbia, SC		8/19/1946 n/a	Aerospace Engineering	United States Naval Academy
Bouchet, Edward	Male	New Haven, CT		9/15/1852	10/28/1918 Physics, Optics	Yale University
Boyd, Gwendolyn Elizabeth	Female	Montgomery, AL		12/27/1955 n/a	Mechanical Engineering	Alabama State University
Brady, Collet Elmo	Male	Louisville, KY		11/25/1888	11/16/1962 Chemistry	Clark University

# Historically Black Colleges and Universities

Est. Year	Name of University	Location	Type of College	Founding Affiliation	Physics Dept.	Natural Sciences Dept.	Bachelors	Masters	Doctorate
1871	Alcorn State University	Lorman, MS	Public	Land Grant	Yes	No	Chem Physics	No	No
1870	Benedict College	Columbia, SC	Private	American Baptist	Yes	No	Yes	No	No
1904	Bethune Cookman College	Daytona Beach, FL	Private	Mary McLeod Bethune	No	Yes	Yes	No	No
1869	Dillard University	New Orleans, LA	Private	United Methodist	No	Yes	Yes	No	No
1891	Elizabeth City State College	Elizabeth City, North Carolina	Public	North Carolina General Assembly	Yes	No	Yes	No	No
1901	Grambling State University	Grambling, LA	Public	North Louisiana Colored Agriculture Relief Association	Yes	No	Yes	No	No
1877	Jackson State University	Jackson, MS	Public	American Baptist Home Mission Society of NY	Yes	No	Yes	No	No
1882	Lane College	Memphis, TN	Private	Christian Methodist Episcopal Church	No	Yes	Yes	No	No
1866	Lincoln University	Jefferson City, MO	Public	Land Grant	Yes	No	Yes	No	No
1854	Lincoln University	Chester County, PA	Public	John Miller Dickey (Presbyterian)	Yes	No	Yes	No	No
1867	Morehouse College	Atlanta, GA	Private	William Jefferson White	Yes	No	Yes	No	No
1935	Norfolk State University	Norfolk, VA	Public	William Mahone	Yes	No	Yes	No	No
1910	North Carolina Central University	Durham, NC	Public	James E. Shephard	Yes	No	Yes	No	No
1876	Prairie View State College	Prairie View, TX	Public	Land Grant	Yes	No	Yes	No	No
1865	Shaw University	Raleigh, NC	Private	National Baptist Convention	No	Yes	Yes	No	No
1896	South Carolina State University	Orangeburg, SC	Public	Land Grant	Yes	No	Yes	No	No
1881	Spelman College	Atlanta, GA	Private	First Baptist Church	Yes	No	Yes	No	No
1927	Texas Southern University	Houston, TX	Public	Houston School District	Yes	No	Yes	No	No
1869	Tougaloo College	Tougaloo, MS	Private	United Church of Christ	Yes	No	Yes	No	No
1881	Tuskegee University	Tuskegee, AL	Private	Booker T. Washington	Yes	No	Yes	No	No
1891	West Virginia State College	Kanawha County, WV	Public	Land Grant	No	Yes	Yes	No	No
1856	Wilberforce University	Wilberforce, OH	Private	AME	No	Yes	Eng. Physics	No	No
1869	Clark Atlanta University	Atlanta, GA	Private	United Methodist	Yes	No	Yes	Yes	No
1866	Fisk University	Nashville, TN	Private	United Church of Christ	Yes	No	Yes	Yes	No
1867	Morgan State College	Baltimore, MD	Public	Methodist Episcopal	Yes	No	Yes	Yes	No
1891	North Carolina A&T	Greensboro, NC	Public	Land Grant	Yes	No	Yes	Yes	No
1882	Virginia State University	Petersburg, VA	Public	Land Grant	Yes	No	Yes	Yes	No
1925	Xavier University	New Orleans, LA	Private	Catholic	Yes	No	Yes	Yes	No
1875	Alabama A&M	Huntsville	Public	Land Grant	Yes	No	Yes	Yes	Yes
1891	Delaware State University	Dover, DE	Public	Land Grant	Yes	No	Yes	Yes	Optics
1887	Florida A&M	Tallahassee	Public	Land Grant	Yes	No	Yes	Yes	Yes
1868	Hampton University	Hampton, VA	Private	American Missionary Association	Yes	Yes	Yes	Yes	Yes
1867	Howard University	Washington, DC	Private	First Congregational Society of Washington	Yes	No	Yes	Yes	Yes

# Advisory Meeting

- Held on July 18, 2014
- Presentation of our work to a small group of attendees from both in and outside of AIP
  - Representatives from the American Association of Physics Teachers
  - Representatives from the American Physical Society
  - Representatives from the AIP Statistical Research Center
  - Experts on African Americans in the Physical Sciences
    - Dr. Jim Stith-Retired Vice President of AIP Physics resource center
    - Dr. Paul Gueye- Current President of the National Society of Black Physicists
    - Dr. Ron Mickens- Distinguished Professor of Physics at Clark Atlanta University, Science Historian
  - And of course Representatives from the AIP Center for the History of Physics and Niels Bohr Library and Archives Staff
- Presentation to show the current progress of the project as well as seek advice and criticism from the advisors in attendance
- Important to realize that this is a project that will take multiple years to finish completely, but that we must finish enough so that the next group of interns can pick up where we left off

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## Resources

Niels Bohr Library and Archives

HistoryMakers

University of Maryland library