

Physics
At Work

Dr. Stephon Alexander

Theoretical Physicist; University Park, PA

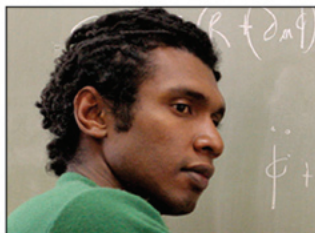
At a very young age, Stephon Alexander learned to embrace the unknown, and explore his two greatest passions: science and music.

Alexander was born in Trinidad & Tobago and moved with his family to the Bronx, New York at the age of eight. His father, who was a taxi driver by day and a computer technician by night, inspired him to expand his knowledge of computers. "My curiosity took me to the local library when I discovered the words 'quantum mechanics...' this was my first introduction to physics."

He attended De Witt Clinton High School, also in the Bronx, where the dropout rate was 60 percent. Alexander found inspiration from his physics teacher, Mr. Kaplan, who was also his music teacher. "I came to school solely to be in his classroom and get my daily dose of kindness and, his knowledge about the laws of nature."

Alexander earned his B.S. in physics from Haverford College, his Ph.D. in physics from Brown University, and also completed postdoctoral work at Imperial College in London and the Stanford Linear Accelerator Center. Currently, he is an assistant professor in the Penn State University physics department.

When Dr. Alexander's research of quantum mechanics, string theory and relativity becomes too intense, he unwinds by playing and composing music. He believes that physics and music have more similarities than people think: "Exploring a physics problem is like jazz improvisation – understanding the basic rules and themes lets you take off in new directions. Music is a wonderful device to communicate the beauty of physics. I like to demystify the Big Bang Theory by breaking it down in terms of sound."



Shaneca Adams

Professional Performer;
New York, NY

Shaneca Adams is a professional performer who grew up in Missoula, Montana. When he first moved to New York, he created his own dance-

theater pieces with simple light and sound, creating a world where the main theme was free expression and artistic experimentation.

In 2004, he joined the Blue Man Group. Adams believes that the performances are so popular because of their unique mix of science and theater. "The Blue Man is a scientific character that interacts with the audience, using timing and sensitivity. The Blue Man constantly formulates theories about how things work and then tries experiments to see if they are correct."

Jon Varo

Performer, Composer and
Music Store Manager;
Nashville, TN

Music has always been a part of Jon Varo's life. He received his bachelor's degree in music, with an emphasis on music synthesis and film scoring. He is currently the store manager at World Music Nashville and an aspiring songwriter.

Varo believes that physics and music share many similarities. "The more you understand about the science of acoustics, the more you truly understand music. For performance purposes, physics is needed in order for an audience to hear music being played. The act of tuning a guitar requires the instrument to be adjusted to a specific frequency; a frequency is a part of physics," stated Varo.



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this connection. Students should be encouraged to see the similarities between the profile of Dr. Stephon Alexander and other people who have made a significant impact in their lives.

Shaneca Adam's profile shows how science and theater are mixed to create professional performances that are so popular. The Blue Man Group's artistic expressions test theories based on how things work, which provide a discussion point that can be elaborated on in class. You could ask them how Shaneca Adam's profile draws a parallel between their *Chapter Challenge* and artistic performances.

Jon Varo's career in music is yet another example of how an understanding of physics works to produce effective musical compositions. Students read how musicians need to adjust an instrument to a specific frequency to achieve the desired results. Consider using this profile to recount some of the investigations where students had to adjust the string length to change the pitch of a sound.

Physics At Work

The *Physics At Work* profiles are meant to show students how people from diverse academic backgrounds apply physics in their professions. Dr. Stephon Alexander's childhood experiences illustrate how his curiosity of computers took him to the world of quantum mechanics. He also found inspiration from a high school physics teacher. Dr. Alexander's personal experiences

provide a significant moment of realization, which students can draw upon to relate to their own experience with a favorite teacher—an experience that they should be encouraged to recount in a class discussion.

Dr. Alexander's passion for music and science further illustrates how physics can be a channel for artistic expression. You might want to ask students how studying this section highlights