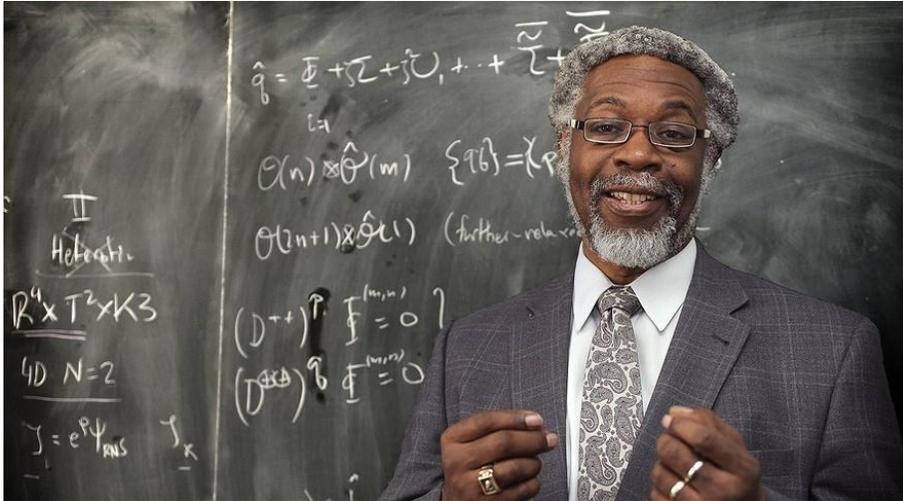


Explaining broader connections and the big picture

By Baltimore Sun, adapted by Newsela staff on 04.09.14

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James Gates, professor and director of the University of Maryland Department of Physics Center for String and Particle Theory, was named Scientist of the Year by the Harvard Foundation. Photo: Barbara Haddock Taylor/Baltimore Sun/MCT

BALTIMORE — Professor James Gates delivers his big ideas in simple but striking terms.

For example, this is what he says about setting lax standards for schoolchildren in science classes: It's like teaching them to dunk a basketball on a 9-foot-high hoop, when kids the next town over play with one 10 feet high.

Gates is a physicist — that is, he studies the nature of matter and energy. More specifically, he is a theoretical physicist,

which means that he uses math to test his hypotheses about matter, motion and how the universe came to be. He has colorful opinions not only about science teaching, but about his fellow scientists as well.

Groundbreaking Ideas In Physics

Without diversity of thought among scientists working together, Gates says, you get nothing but classical music. There is little innovation without different types of people working together.

“When you let different people create different music, you get things like rock ‘n’ roll, jazz,” Gates said. “I have a particular kind of individualized viewpoint about the way mathematics I do should work.”

His research at the University of Maryland, College Park focuses on translating that complicated math into something digestible for other scientists and the rest of us. Much of his work seeks to replace messy equations with a relatively simple set of pictures and diagrams.

Gates gets a lot of attention because he has groundbreaking ideas in the field of physics, and he is able to explain his ideas better than anyone else. Last year, he received a National Medal of Science from the National Science Foundation.

Last month, the Harvard Foundation bestowed on him the title of Scientist of the Year. He sits on both the state school board and the President’s Council of Advisers on Science and Technology.

Gates is about as famous as a theoretical physicist can get. In a popular video by the PBS show “Nova,” he attempts to explain a complicated theory called string theory in 30 seconds.

These days, Gates is continuing his own work in physics. At the same time, he is also making efforts to ensure young scientists can pick up where he leaves off.

“Most scientists, we get busy with our own work. Not many take the time to spread it at a level that is understandable for the general public,” said Professor Jogesh Pati. “Jim has great strength in doing it. Beautifully, he does it.”

Field Of Supersymmetry

Gates' work is devoted to simplifying the complicated.

His specialty is something called supersymmetric string theory. This seeks to mesh the two major branches of physics, Einstein's theory of relativity and quantum mechanics, into a single set of rules governing the universe. The former takes in the vastness of space and time to explain gravity; the latter focuses on the rules guiding atomic and subatomic phenomena.

The 63-year-old's interest in the physics of things was sparked by a science fiction movie he saw as a small boy and a book on space travel his father brought home. Before delving into a career in physics, he nearly became an astronaut. Eventually, he settled on the field of supersymmetry.

To make an important contribution, all scientists need to tread into new territory. Gates, however, stands out for his ability to lead others along his path, those who work with him say.

“He sees things in a geometric way,” said physicist Martin Rocek. This approach “is a way that allows you to visualize things” — to see them in your mind's eye. “That makes things more understandable.”

One of Gates' first important papers was “Superfield supergravity” in 1979, a collaboration with physicist Warren Siegel. Rocek recalled that Siegel had some provocative and original ideas in papers he had published on his own, “but nobody understood them at all.” When Gates joined Siegel on the 1979 paper, he clarified the ideas enormously. Since then, the work has been used by others hundreds of times.

As the ideas caught on in the physics community, Pati and others took notice. Pati began pushing to lure Gates from

Massachusetts Institute of Technology (MIT), where he was then teaching, to Maryland.

“I actually pleaded with the department that we should hire him, and they agreed,” Pati said.

String Theory In 30 Seconds

Since coming to College Park in 1984, Gates has taught classes nearly every semester. He first learned of his fondness for teaching while tutoring members of MIT's Black Student Union. Back then, many black students still didn't feel comfortable asking teachers for help, Gates said.

“To me that was really exciting, to get that light to turn on in their eyes,” Gates said.

Students who have listened to his lectures said Gates' style is illuminating. This is thanks to his ability to explain broader connections and the bigger picture.

Gates' responsibility extends far beyond his own students, however. In 2009, Gov. Martin O'Malley chose him to help schoolchildren statewide. “Maryland is, as far as I can tell, the only state in the country that has a theoretical physicist on its board of education,” Gates said.

Gates' powers of explanation also have helped him bring science to general audiences.

As part of a “Nova” TV series called “The Secret Life of Scientists and Engineers,” he lays out in half a minute the idea behind string theory — or most of it. “I tried,” he says at the end.

In another Nova program, he lays out a lofty standard for success — that “I will, by the end of my career, have done something of value for our species.” Science, he said, is the foundation for the technology that improves our lives. Ultimately, it is what may save us from global warming and other perils.