

Regional

Hamad studies, teaches properties of light

Aldemaro Romero College Talk

Light is a natural phenomenon we take for granted because it is everywhere. We could not live without it. And while it may seem that we know everything that there is to know about light, there is still much to be learned about its properties. Including, it seems, what it actually is.

"We do not know what light really is," said Abdullatif Hamad, a professor and chair of the department of physics at Southern Illinois University Edwardsville. "We know it behaves like a particle and we can see the particle behavior of light as it interacts under certain circumstances or conditions. Under other conditions it behaves or shows the behavior of a wave, but the essence of light is still not known."

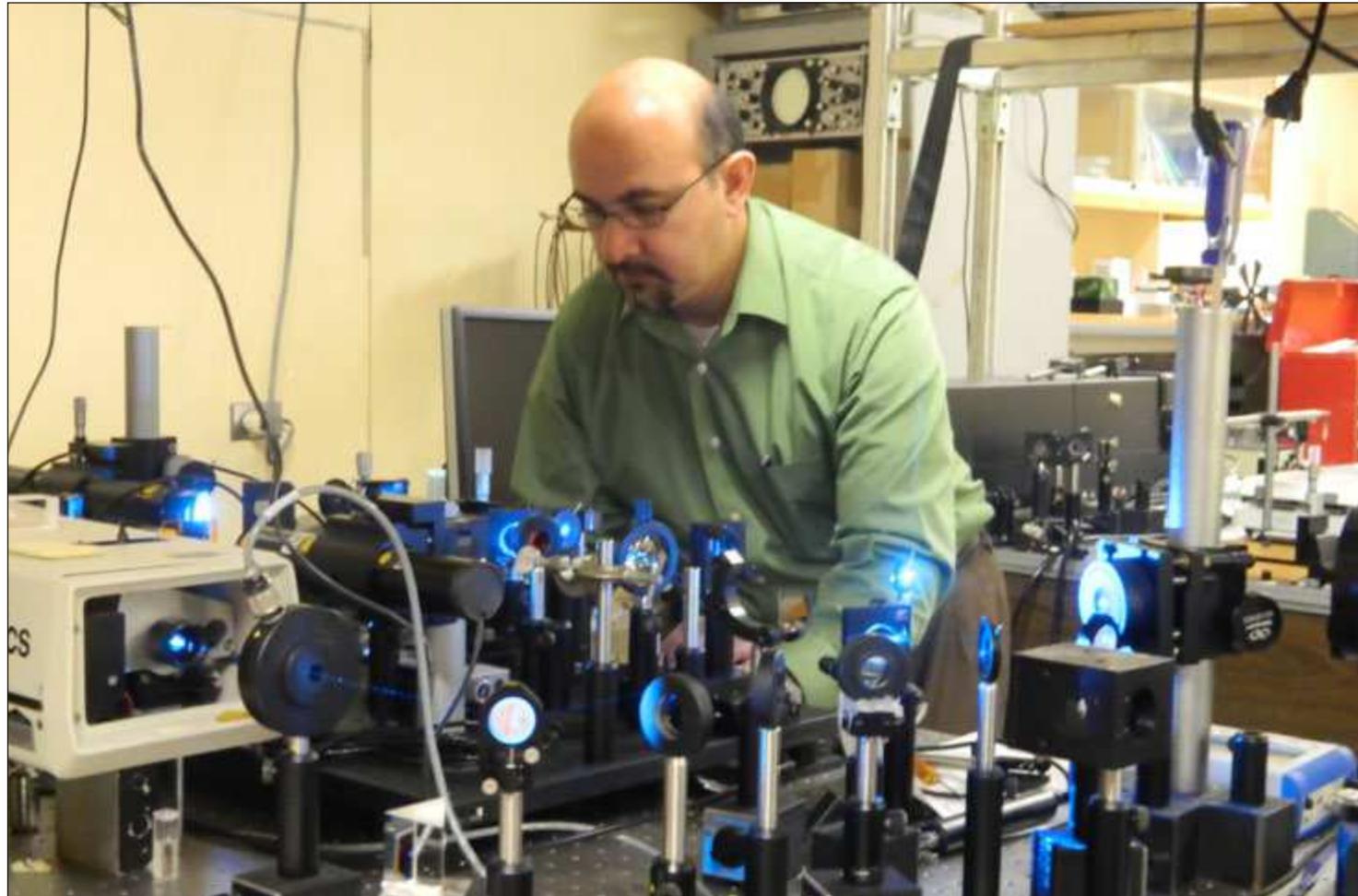
Born in Bazarya, West Bank, Palestine, Hamad obtained his bachelor's degree as well as his doctorate in physics at Oklahoma State University. He said he became interested in learning about how things work when he was only 13 years old. And that fascination has continued.

"When I went to college, one of the professors opened my eyes," he said. "I would see how he would teach physics and explain things. I realized that this is the field where I could learn most about natural phenomena." Hamad's area of specialization is optics, the main objective of which is to study the behavior and properties of light.

"Remember that in physics and science in general, we build models," Hamad explained. "That way we can understand the behavior of materials, such as light, and as a result we can use them for certain applications." The knowledge that scientists like Hamad have gained about the nature of light has allowed for its many uses, from ordinary home light bulbs to lasers that are used in medicine and manufacturing.

But just how is light produced? According to Hamad, it's a rather simple process.

"Light is the product of the excita-



Dr. Hamad in his laser lab at SIUE

tion and relaxation of electrons and atoms," he explained. "So we can excite atoms by many means, for example by chemical or electrical methods. If we are talking about generating light, then we need to have the so-called radiative process. When the electron is excited to a certain level, it will need to give off some energy." We then see this energy

in the form of light. However, we can't see all light.

"We humans see in the range of what we call the visible region of the spectrum and our eyes are sensitive from red going all the way up to violet," Hamad said. "We are more sensitive in the green, where the highest sensitivity of our eyes is. Anything below the red

– that's what we call infrared – our eyes cannot see. Anything above the ultraviolet we cannot see."

A few months ago some scientists announced the results of an experiment showing some particles that could move faster than light, something considered impossible and contradictory to Einstein's work on relativity. Soon,

however, the results were retracted.

"I think what they found was probably a loose cable or something," Hamad said of the experiment. "We do not have any evidence that something is moving faster than light. That is not to say that this is not going to happen or that it is impossible, but we don't have any evidence up to this moment that shows otherwise."

One of Hamad's areas of interest is lasers. We interact with lasers every day, whether it's the bar code scanner in the supermarket or our home CD or DVD players. But lasers have so many more important applications.

"Lasers are really fantastic, fascinating devices," Hamad said. "The main difference between lasers and other light sources like a flashlight is that in lasers all the photons behave in a similar fashion. We call it coherence. They also direct in the same direction and are confined to a very small area, which gives them their high intensity and which is unique to lasers." Hamad's current research involves the development of lasers.

"I am always hoping that I will be able to develop an orange laser that is based on one of the unique rare earth ions," he said. "I am not going to say which one, but hopefully we will be successful so we can produce another reliable, strong, orange laser for humanity to use."

Aldemaro Romero is the Dean of the College of Arts and Sciences at Southern Illinois University Edwardsville. His show, "Segue," can be heard every Sunday morning at 9 a.m. on WSIE, 88.7 FM. He can be reached at College_Arts_Sciences@siue.edu.

Photo courtesy of Orlando Phillips