UCI Physical Sciences hosts John Rosendahl’s Adventures in Physics

Local middle school and high school students visited UCI to see physics in action.
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Noah Hinojos of the UCI School of Physical Sciences looks on as a liquid nitrogen cannon blasts a bottle across the stage of the Physical Sciences Lecture Hall.

Picture Credit:
Hana Schiff

Last Saturday, in the Physical Sciences Lecture Hall, UC Irvine’s Noah Hinojos stood over a small metal cannon. Hinojos, who’s a research and development engineer in

the Department of Physics & Astronomy, gripped a large wooden mallet and started hammering a plastic bottle into the cannon's mouth.

Then, abruptly, Hinojos stood back, twisted a valve on the cannon, and waited.

Boom!

The bottle popped off the mouth of the cannon and flew across the stage while liquid nitrogen poured from the cannon and spread out on the floor.

The audience cheered and clapped.

"At today's assembly, we're going to talk about motion," said Hinojos. "How things move, and why they do."

The demonstration was part of John Rosendahl's Adventures in Physics, which is an annual event that sees middle school and high school students from the area visit the UC Irvine School of Physical Sciences so they can see physics experiments in action and hear from UCI students and faculty about what it's like to be a college student.

The program, developed with funding from the University of California and the National Science Foundation, is the outgrowth of an assembly program developed by the late John Rosendahl and Professor Bill Heidbrink in the UCI Department of Physics & Astronomy. Teams of undergraduates perform shows on electricity, waves and momentum at local elementary school assemblies, and each year the annual on-campus event showcases one of the assembly shows as well as research happening at the School of Physical Sciences.

Rosendahl passed away in 2012, and a subsequent donation endowed the program in his name.

Hinojos' cannon blast was a demonstration of the physics concept of momentum, which is the product of the mass of an object and its velocity, and which was the main theme of the day.

Another experiment saw the students enter a jousting tournament. But it wasn't jousting with horses and lances – it was jousting with dollies and tin cans.

Two student volunteers came and sat on two dollies that faced one another on the stage.

The sides of the dollies had tin cans attached to them, and the job of the volunteers was to take hold of opposite ends of a rope and at a signal from Hinojos and his team, yank the rope at the same time and careen toward one another and try to crush as many of their opponent's cans as possible.

First, though, there was a discussion about momentum.

"What's the momentum of this volunteer?" Hinojos asked the audience.

"Zero!" The audience shouted.

"And what's the momentum of this volunteer?"

"Zero!"

But as soon as the volunteers tugged on the rope, their momentum shot up and the dollies collided and the cans crushed.

The day then took a subatomic turn when Professor Pedro Ochoa-Ricoux of the UCI Department of Physics & Astronomy gave a presentation on the neutrino – the subatomic particle discovered by Nobel Laureate and UCI physics professor Frederick Reines.

The neutrino, Ochoa-Ricoux said, is the "ghost" of subatomic particles because, unlike particles like electrons, it's very difficult to detect despite it apparently being the second most abundant particle in the universe.

"We're constantly bombarded by neutrinos," said Ochoa-Ricoux, who explained how Reines detected the neutrino by placing a particle detector next to a nuclear reactor, which is the most intense man-made source of neutrinos.

Ochoa-Ricoux described how another particle – that which might comprise dark matter, which many physicists think makes up most of the matter in the universe – could turn out to be among the most abundant particles in the universe alongside particles like neutrinos. But scientists have been unable to discover direct evidence for dark matter's existence, though efforts are underway at UCI to remedy that.

"Perhaps one of you will discover it in our lifetime," Ochoa-Ricoux told the students.

The event concluded with a panel of undergraduates answering high school students’ questions about college life.

When asked about the purpose of the event, Heidbrink said “I love physics. My hope is that these fun shows and stimulating lectures will delight young people from all backgrounds and demonstrate to them the power of physics to describe our natural world.”

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