Princeton Plasma Physics Lab scientist awarded $2.6M research grant

By **Nicole Mulvaney | For NJ.com**
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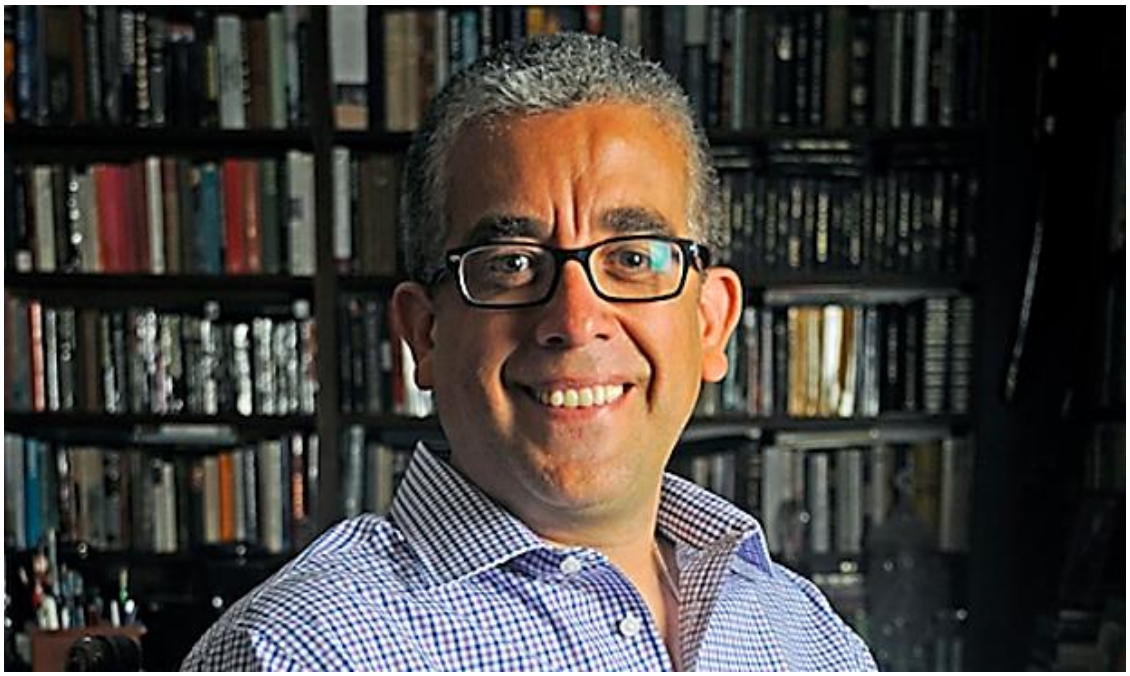


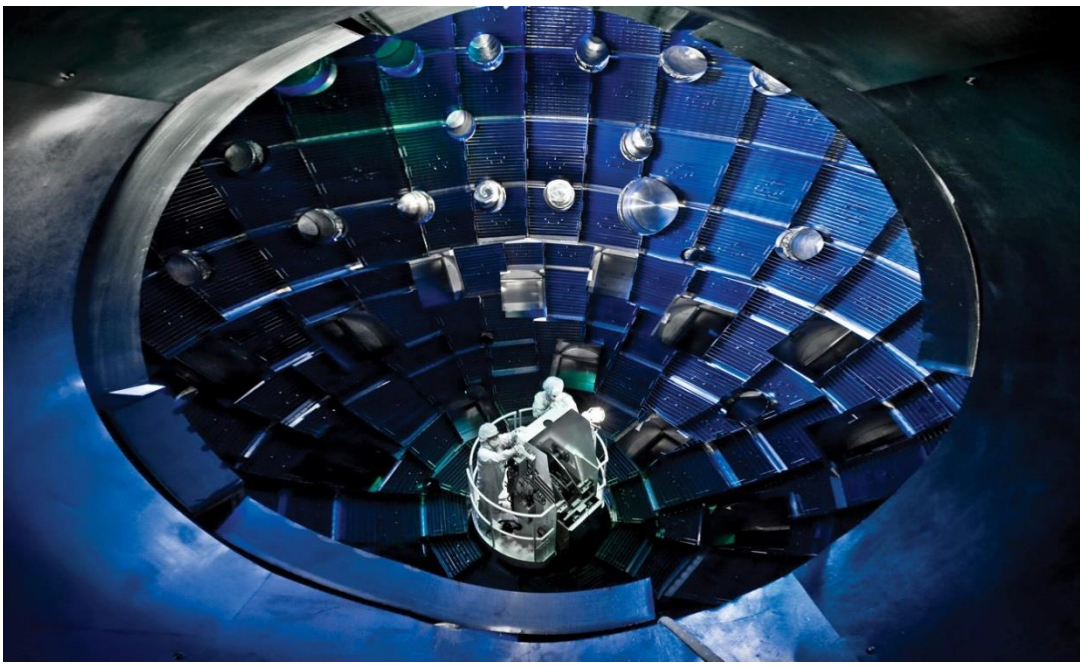
Luis Delgado-Aparicio, a scientist at Princeton Plasma Physics Laboratory, won a $2.6 million Early Career Research Award from the Department of Energy's Office of Science for his research on fusion energy. (Claudia Cisneros | Princeton Plasma Physics Laboratory

PLAINSBORO — Luis Delgado-Aparicio was in route to Peru to visit his ailing father last month when he learned he was the recipient of a $2.6 million research award.

Delgado-Aparicio, a physicist at the Princeton Plasma Physics Laboratory, phoned his parents to inform them of the exciting news. His father died a half hour later, shortly after Delgado-Aparicio boarded an airplane to visit him.

"My family has always been very, very important to me. The good thing was that I had enough time to convey the information to my dad," said Delgado-Aparicio, a Montgomery resident. "Although I lost my dad to a very bad pancreatic cancer, I think my dad left the world extremely happy and excited."

The five-year grant award from the Department of Energy's Office of Science will fund Delgado-Aparicio's research on eliminating a barrier to developing fusion power as a safe, clean and affordable source of electric energy, he said.



Delgado-Aparicio, who joined the Plainsboro-based lab in 2009, is one of 44 winners of the Early Career Research award nationwide and the third researcher at the lab to win. He and his 10-year-old son Mateo were back in Lima, Peru for a memorial service for his father when the award was officially announced last week, he said.

"I was ecstatic. I was extremely, extremely happy," Delgado-Aparicio said. "This gives me great motivation to continue working over the next 10 years in this fantastic environment in Princeton."

Fusion occurs when a super-hot electrically-charged gas called plasma is heated to temperatures hotter than the sun's core and becomes dense enough to fuse atoms, creating a burst of energy.

"Obviously there are some challenges to confining something so hot," Delgado-Aparicio said.

His research focuses on eliminating any impurities that cool the plasma or inhibit the fusion reaction. Delgado-Aparicio will use the funding to develop a process for researchers to identify, analyze and flush these imperfections out of the plasma, he said.

"We want something very stable," he said. "If you remove the impurities, you will have a much cleaner fuel."

Delgado-Aparicio plans to study how the impurities react with the plasma by using an X-ray diagnostic to show what happens to the plasma when imperfections are introduced.

The device will reveal their size and location and the kind of energy they radiate, which will identify the sources and properties of how they are transported in fusion plasmas, he said. The test will also show how the impurities affect the energy and temperature of the plasma.

Delgado-Aparicio's findings will have implications on **the National Spherical Torus Experiment-Upgrade, a nearly three-year $94 million project at the Plainsboro lab**, and other experiments in France and Switzerland.

Physicists worked on a National Spherical Torus Experiment from 1999 to 2011 and are currently working on the machine's upgrade that will essentially double the power of the reactor by increasing plasma heat, electrical current and magnetic field strength.

The new machine will transform its plasma reactor into what scientists say will be one of the most advanced in the world.

"We are in a very, very exciting time," he said. "We are going to have a fantastic reactor here in Princeton that will be very useful for future developments."

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