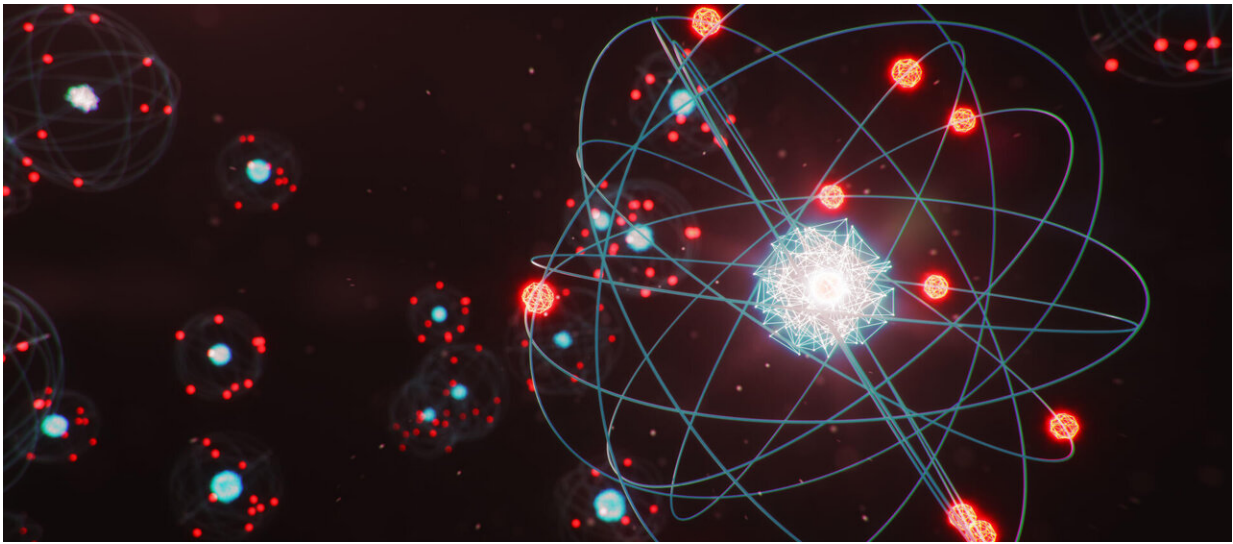


# Professor's milestone in nuclear physics seeks to understand the universe itself

August 4 2020, by Chrystian Tejedor

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An atom. Credit: Florida International University

A nuclear physics professor from Florida International University was among a team of researchers that proposed something so out of this world, colleagues first hesitated to accept it was possible.

In 1993, they boldly predicted how the densest materials in the universe—known to exist only in rare neutron [stars](#)—could be made here on Earth. Ultimately, their research was published in *Physical Review C*, a leading [academic journal](#) focused on nuclear [physics](#).

It spawned a wave of follow up research that in 2006 confirmed their prediction was true. For the tiniest sliver of a second, researchers at the Thomas Jefferson National Accelerator Facility in Virginia were able to briefly create the material that exists inside a neutron star.

"You are wrong many more times than you are right," said Misak Sargsian, who joined FIU in 1998. "This was a rare case where the prediction was confirmed. That's actually quite cool when you succeed."

For its 50<sup>th</sup> anniversary, *Physical Review C* highlighted research the journal's editors consider [milestones in nuclear physics](#). At the top of the list was the paper by Sargsian and his colleagues Donal Day, Leonid Frankfurt and Mark Strikman.

At the root of this work lies the desire to understand the universe itself.



Florida International University nuclear physics Professor Misak Sargsian.  
Credit: Misak Sargsian

So much of the work of nuclear physicists focuses on atomic nuclei because they create mass and structure. Planets, stars, moons—even people—cannot exist without atomic [nuclei](#). Understanding the nucleus of the atom helps us better understand the world and the worlds around us.

FIU physicists Werner Boeglin, Wim Cosyn, Lei Guo, Pete Markowitz, Rajamani Narayanan, Brian Rau and Joerg Reinhold are among an international research team in a forefront of [nuclear physics](#) research at

the Jefferson Lab.

Guo was among an international research team that published a 2018 study on the [mechanics of atomic nuclei](#). Their findings made it likely for scientists to rethink the threshold at which a certain star morphs into a black hole.

For Sargsian's part, his work is evolving. Like an archaeologist slowly sweeping aside layer upon layer of dirt and rock to uncover ancient mysteries, he is now trying to unravel the inner workings of that which came before the [atomic nuclei](#)—the quarks and gluons. If Sargsian and his students can figure it out, we just might know more about the big bang itself.

"There's more that we don't know, than we know," Sargsian said.

**More information:** L. L. Frankfurt et al. Evidence for short-range correlations from high $Q^2(e,e')$  reactions, *Physical Review C* (2002). DOI: [10.1103/PhysRevC.48.2451](https://doi.org/10.1103/PhysRevC.48.2451)

Provided by Florida International University

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