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WEATHER BLOG

## Super-massive black hole discovery brings home the Nobel Prize in physics, and an RIT professor helped

Interview with RIT scientist on his work with the super-massive black hole

11 minutes left



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ROCHESTER, NY (WROC) – The [Nobel Prize in Physics](#) was awarded to three people for their work with the super-massive black hole that sits at the center of our Galaxy. Roger Penrose, Reinhard Genzel, and Andrea Ghez all helped contribute to the technology to discover, the discovery, and the measurement of this black hole.

“Half the award was given to Sir Roger Penrose for his foundational work on establishing the theoretical framework for black holes. So general relativity, Einstein’s general relativity, predicts black holes and Roger Penrose is the one who established that connection in 1965. So it’s been a long time.”

According to Figer, Nobel Prizes are not given often until someone observes proof of a theory.

“Reinhard Genzel, the director of the Max Planck Institute, did this project measuring the speeds of stars in the center of the galaxy. He found there must be a huge amount of mass in the center because the only way to get things flying around a common point is if there’s a bunch of mass in the center due to gravity. He did that experiment, the UCLA group verified it, confirmed it, and year-by-year they got better and better measurements. Finally, it got to the point where everyone agreed that there’s no way there could be that much mass unless there was a super-massive black hole.”

“What the two groups are doing now, Genzel and Ghez, they’re looking at objects that get really close to the black hole. When I say objects, I mean stars and gas. They look at the motions, and see if the motions are predicted by Newtonian laws or laws of relativity, and it looks like in every case where there’s a distinction, it’s the relativistic laws that give the right prediction, which means Einstein is right!”

It was about ten years after most astronomers agreed that the results in the field were right. Figer worked on a project to prove that early estimates of the mass of the black hole were too small. He used the velocity of objects around the black hole to show that it was, in fact, four million solar masses instead of two million masses.

“It takes a while for people to bicker back and forth in a healthy way and for the field to get advanced, and they went on to making far more precise measurements in the end and it turns out to be a four million solar mass black hole.”

“The Nobel Prize was directly enabled by advanced technology that Reinhart Genzel developed himself with his group and used at the European Southern Observatory at the very large telescope, as they call it the very large telescope, and that’s also true with Andrea Gez, she used cutting edge instrumentation at the Keck observatory, some of which I developed. I was an optical designer on the infrared spectrograph at keck, which they used in part to make this discovery. So it’s the people who do the observations, but also the people that are developing the technology that makes the observations possible.”

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