UA Astronomer’s TED Talk Inspires Women Across the World

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While pursuing her doctorate, Burçin Mutlu-Pakdil discovered an especially rare, double-ringed galaxy. The discovery drew international attention, and the galaxy is now known as Burçin’s galaxy.

Mutlu-Pakdil, now a postdoctoral fellow at Steward Observatory, was awarded a TED Fellowship in January, allowing her to share her discoveries with audiences across the world. She spoke at TED2018, held in April in Vancouver, Canada. Her TED Talk, which was posted online Aug. 28, can be watched here [1].

According to what astrophysicists have learned about the laws that govern how galaxies form, Burçin’s galaxy is an object that should not exist. In a conversation with Lo Que Pasa, Mutlu-Pakdil takes us on a journey to a galaxy 359 million light-years from Earth, which, by the standards of astronomers who study deep space, is actually not “far, far away.”

What makes Burçin’s Galaxy so special?

Most galaxies come in three types: spiral galaxies, elliptical galaxies and what we call irregularly shaped galaxies. Our Milky Way, with its familiar pinwheel shape, is an example of a spiral galaxy. Elliptical galaxies resemble a ball of stars. They usually are spherical or egg-shaped, and they tend to be older than the spiral type. Irregular galaxies do not have a distinct regular shape.

My team and I were studying a spiral galaxy when, by chance, we noticed another galaxy in our image that was unlike any other. It had a very symmetrical center body with a very symmetrical ring around it. So, at first, we thought it was another example of what we call a Hoag-object. A Hoag-object is another type of rare galaxy. It has a central body consisting of a condensed ball of stars, surrounded by stars arranged in a spherical ring. Such ring structures are common in galaxies with spiral arms or disc structures, and we understand that process. But in Hoag-objects, which don't have spiral arms or discs or bars, we don't understand how a ring can form. Sometimes galaxies may have ring structures due to environmental interactions like colliding with a nearby galaxy, or swallowing some of its material, but these interactions generally cause some asymmetrical features, not spherical rings. But in a Hoag-object, as well as in the galaxy we discovered, the outer ring is very symmetric, and this puzzles us.

What was even more surprising about this galaxy is that in addition to the outer ring of stars that we knew from Hoag-objects, we discovered that there is a second, very diffuse inner ring. This is unlike anything we have seen before. The inner ring is brighter, in red color, which tells us that it contains an older star population, and the outer ring is blue, indicating a younger star population. We have no idea how that came to be. We believe two major, separate events
must have occurred, creating the inner ring first and later, the outer ring. Right now, the most plausible explanation for the outer ring is that it was a lonely elliptical galaxy, and nearby was a gas-rich dwarf galaxy and it slowly accreted material, and because of the slow change, it didn't change the central body, and because it happened slowly, it maintained this symmetry. We only have this one sample, so we need to find more examples.

**How did the galaxy's name come about?**

When we published this paper, we just used the catalog number: PGC 1000714. The journalists who covered it didn't like the number, so they called it Burçin's galaxy and the name stuck.

**You pick only the rarest and most unusual galaxies for your research. Why?**

I think of it this way: We can study hundreds of common galaxies, and the knowledge we will get from those will add another drop of information to the pile of knowledge we already have. But with rare galaxies, every single drop is so valuable. One rare galaxy may challenge hundreds of common galaxies in terms of what we can learn about them. And because they are so rare, I think it is really important to focus on those. It's like finding a diamond in a copper mine. The scarcity of these objects makes them unique and valuable.

**What made you want to be an astronomer?**

Since I was little, I have always been intrigued and inspired by the sky. A turning point was a homework assignment in middle school. We were tasked with writing an article about "an ideal person." So, I started thinking, "Who is the smartest person in the world?" I asked my sister, and she said, "I don't know. Maybe Albert Einstein?" So I began reading about Einstein, and I became obsessed. I read several kids’ books about physics and astronomy. It is so incredible to think how small the Earth is. Outside of our home, there is an incredible world waiting for us. I feel it's like being in New York City, with all its multicultural diversity and festivals going on outside? and staying inside your hotel room instead of going outside and experiencing all those different cultures and events. I just want to see what is going on out there.

**How did you become a TED fellow?**

When I was about to finish my Ph.D. at the University of Minnesota in January last year, I attended a meeting of the American Astronomical Society. I spoke with a career consultant, and when I showed her my CV, she advised me to apply for a TED Fellowship. I thought it was a long shot, but I applied anyway and got it. As a TED fellow, you become part of a community of incredible people from all over the world. We call it the TED family. We’re part of a huge network, and TED provides us with resources and a voice. We give TED Talks and they reach millions of people. Because of my background (first-generation college student as well as a Turkish woman studying STEM), I had difficulty reaching people. I really wanted to reach out to people and show people that it doesn't matter what background you have; you can still make incredible discoveries and share them with the world. Following my TED Talk, I received amazing reactions from across the world. From India to Africa, from the Middle East to Turkey, many women wrote to me saying they had always been interested in astronomy, but their society or economic conditions didn't allow them to pursue it. They said my example really inspired them.

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