

Q&A: Burçin Mutlu-Pakdil chases dwarf galaxies

She navigated barriers in Turkey and the US to become an astronomy professor.

Write an essay on your ideal person. That assignment in middle school set Burçin Mutlu-Pakdil on the path to becoming a scientist. Wondering who the “cleverest person in the world” was, she started reading about Albert Einstein and his science. She became especially interested in astronomy.

That interest took Mutlu-Pakdil from Istanbul, Turkey, where she grew up, to the country’s capital city of Ankara for her bachelor’s degree. She earned her PhD from the University of Minnesota in 2017. An unusual galaxy she studied as a PhD student is informally named after her. Today she is an assistant professor of physics and astronomy at Dartmouth College. An observational astronomer, she studies tiny, faint dwarf galaxies; she hopes they will reveal secrets about dark matter.

In 2018 Mutlu-Pakdil was named one of the Ten Outstanding Young Persons of the World, a program run by the nonprofit, nongovernmental organization Junior Chamber International. The following year she was named an IF/THEN Ambassador, as part of a program created by the American Association for the Advancement of Science and Lyda Hill Philanthropies to inspire women to pursue STEM fields.

PT: Describe your education.

MUTLU-PAKDIL: In Turkey, universities accept you based on your performance on an exam at the end of high school. Physics doesn’t require as high a score on the exam as medicine or engi-

neering. My score was high enough to go into medicine or engineering, but I wanted to study physics. Unfortunately, when you get a physics degree in Turkey, people think you will become only a teacher, not a scientist.

I chose Bilkent University because at the time it was the best research institution and had the highest-ranking physics program in Turkey. The university is in Ankara, about a six-hour drive from Istanbul. Some people criticized my family, saying that “girls shouldn’t live by themselves.”

But growing up, my sister and I had always heard our father’s stories about not getting an education beyond fifth grade due to financial issues. That motivated us. He kept saying, “To do good things in society, you need an education. To have a role in society, you need to get an education.” So when I wanted to go to college and said I would leave my hometown, my parents were super supportive.

PT: Why did you come to the US for graduate studies?

MUTLU-PAKDIL: When I went to college, I decided to practice hijab. At the time in Turkey, the law was that you cannot wear hijab in any public institution, including universities.

There were 4 women studying phys-

ics out of about 25, and I was the only one practicing hijab. I could wear hijab on campus, but not in the classroom. I used hats and turtlenecks to cover myself. It was a very awkward situation that affected my performance.

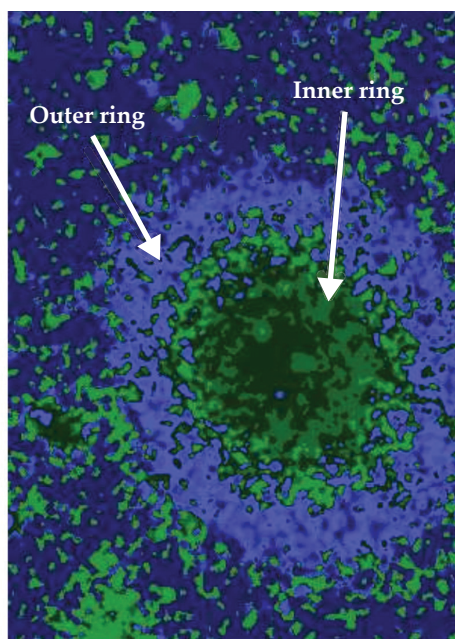
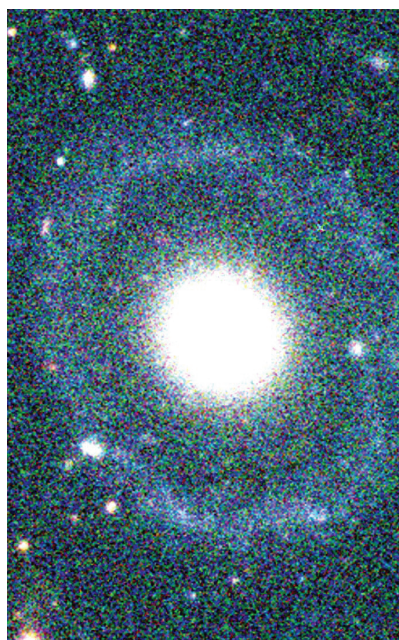
Although I enjoyed my classes, I felt like a secondary citizen in my own country. That’s why, in 2009, after I graduated, I wanted to leave Turkey, not only to get a higher education but also to live my true self.

PT: You went to Texas Tech University. Why?

MUTLU-PAKDIL: I knew a person from my college who got into Texas Tech. I thought, I will not be alone. It was the only place I applied. I got in. And then I realized there was no astronomy program. I did a master’s degree in experimental biophysics. I didn’t like it, be-



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BETTER KNOWN AS BURÇIN'S GALAXY, the elliptical galaxy PGC 1000714 has two rings. The outer one stands out in the false-color image at left; the inner ring is also visible in the color index map at right. (Left image from Ryan Beauchemin; right image from B. Mutlu Pakdil et al., *Mon. Not. R. Astron. Soc.* **466**, 355, 2017.)

cause I am a bit clumsy. Experimental labs are not my environment.

I still really wanted to do astronomy. During my master's degree, I learned how American universities work. I finally started a PhD in astronomy at the University of Minnesota.

PT: What was the focus of your studies?

MUTLU-PAKDIL: My PhD research was on scaling relationships between galaxies and their supermassive black holes. After I did my first paper, my adviser asked if I wanted to follow up on an interesting object that he and others had spotted in their survey. They thought maybe it was a second Hoag's Object—an elliptical galaxy with a blue ring around it. It's a puzzling object, and we still do not know how it formed, how it became so symmetric, or how the ring structure formed.

Later I discovered that the new object had a second ring hiding in its central bright body. We were having a hard time explaining the outer ring in Hoag's Object. Now we had an object that had an inner ring with a different color. That made it even harder to explain.

We published a paper about the galaxy, and we made a fun video about it. In the video, we called it Burçin's

Galaxy. It has a catalog number—PGC 1000714—but people started calling it Burçin's Galaxy.

PT: What are you doing now?

MUTLU-PAKDIL: When I started postdoctoral research, I got really excited about other types of extreme galaxies: small, faint dark matter-dominated galaxies. Cosmological models predict that they must be the most numerous galaxies in the universe. But since they are faint and small, these dwarf galaxies are hard to find, and we have a very limited understanding of their formation.

PT: What makes those galaxies interesting?

MUTLU-PAKDIL: We know that 85% of matter in the universe is dark matter. Dwarf galaxies barely have stars; they barely have gas. They are basically the cleanest laboratories we can find to study dark matter. By counting how many dwarf galaxies are out there and determining how they are distributed in the sky, we can put significant constraints on the nature of dark matter.

PT: What did it mean to you to be named one of Ten Outstanding Young Persons of the World?

MUTLU-PAKDIL: I was named an Outstanding Young Person for Turkey after the discovery of Burçin's Galaxy. I was too busy to go to that ceremony or the ceremony in India for the world award. But my family went in Istanbul and accepted the award for me. You cannot imagine how emotional they got. Professors congratulated my father about me. Seeing my family proud and happy was the most important award I could get.

PT: How did you build up your research group at Dartmouth?

MUTLU-PAKDIL: My group has two postdocs, two graduate students, and four undergraduates. Experience can be acquired, and it's simpler to teach a technique than to inspire someone to work on something they're not passionate about. Passion is the key quality I seek in my group members.

PT: Is there anything you'd like to add?

MUTLU-PAKDIL: After the discovery of Burçin's Galaxy, a friend called me and said, "You are an inspiration for our kids!" Then she said, "How about your husband? Are you reuniting with him?" I had met my husband when I was in the PhD program, and we maintained a long-distance relationship. I said, "No, we will continue long distance." Then the friend said, "You know, a career is good, but the family is more important. Maybe you should give up your career and go live with him."

I pointed out that she had just said I was an inspiration for her kids, and now she was saying I should quit. I asked my husband if people tell him that family is more important than his job, that he should quit his job and go to his wife. They don't. It's a hypocritical thing that people do only toward women, telling them to value family over career.

Once I came to Dartmouth, my husband joined me. We had thought we would unite after each step. But a postdoc is short, and he didn't find a job where I was. Unfortunately, this is very common in academia. One time, I remember as a postdoc complaining about being long distance, and then I realized that everyone in the meeting was in the same situation. It's a big systemic problem.

Toni Feder **PT**