Isabella Ramalla – Searching for pulsars

I am currently studying the central region of the Milky Way galaxy; in particular I am searching for specific types of stars called pulsars. Pulsars are fast rotating neutron stars that have regular pulses whose time of arrival at our telescopes can be accurately predicted and timed. The ability to time them very accurately, makes pulsars excellent tools for fundamental physics and astrophysics. In the center of the Milky Way galaxy, we search specifically for pulsars in close orbit around a stellar mass or an intermediate mass blackhole. We also search for them around the supermassive blackhole that we now know lives at the dynamical center of the galaxy. If such systems can be found, we would have discovered holy-grail astrophysical laboratories. In these systems, pulsars could be used in many ways;

- They would allow us the ability to directly, and accurately, measure the properties of the blackhole they orbit, thus giving us a better understanding of blackholes and their dynamics. In addition, this could potentially enable the stringent tests of gravity theories.
- Even if the newly discovered pulsars are not necessarily orbiting a blackhole, by studying pulsars in the center of the galaxy, we could use them as probes to precisely measure the properties of the very complex Interstellar medium in the Galactic center region, which is not yet well understood.
- In addition, a discovery of a population of pulsars in one of the stellar clusters, especially the Nuclear cluster that is closest to the Supermassive black hole, could help us understand the complex history of how stars form and how they evolve in the central region of galaxies.

The one thing I am impressed by is how the modern radio telescopes are starting to give us a detailed view of the sky like never before. New astrophysical objects are starting to be discovered and new light is shed on some objects that we thought we understood better in the past. I am particularly proud to have been part of the group that have produced the most detailed image (to date) of the center of the galaxy.

Of course there are many challenges that are faced daily during this quest. Most of the challenges are technical, including but not limited to, the sheer amount of data that needs to be collected, processed and stored. For me, this has challenged my ability to work with computers and demanded that I improve my computation skills, which I am currently working on. Although this may be a challenge, I do appreciate the transferable skills that I am learning in the process.

To the girls that are enthusiastic about astronomy, I would advise you to keep fueling that

passion as much as possible by getting involved in as many science and astronomy related activities. Keep yourself informed of the developments in astronomy by reading books and science magazines/articles, as well as watching science shows and documentaries. At least this is what used to fuel my enthusiasm when I was younger. As a child, I had somehow already developed an interest in science. I questioned everything and asked way too many questions. Unfortunately for me, there was never anyone around me that could answer my questions. Books and documentaries were all I had. However, it was only in my final years of high school that I realized I was fascinated by the night sky. I was fortunate enough, to some extent, to have grown up in an area that did not have light pollution. Every night I had the most beautiful view of the night sky, and with every gaze, I had questions about the stars. I knew then that I wanted to take up studying the stars as a career.