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# 1 INTRODUCTION

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The night before I started work as a tour guide at the observatory, I had a nightmare.

I dreamed that I arrived at the observatory half an hour early, and sat down to relax with a coffee. But in the way of dreams, time jumped, and before I'd drunk half of it, I was already late. I realised that I should have been greeting visitors on the helipad fifteen minutes ago. I dashed into the car park, only to find that my car had vanished, so I ran uphill and arrived at the helipad gasping. I found it crowded with Japanese tourists, all standing around patiently waiting for me to explain Cherenkov radiation *in Japanese*. At which point I woke up, to my intense relief.

Four years later, I still don't speak Japanese. But I'm a lot more confident about explaining things: how the telescopes work, how they're run, the things they have in common and how they differ from each other.

So travel with me up two hundred hair-pin bends and nearly 8,000 ft, and pop out above the trees and clouds to a mountain covered with bushes and huge, surreal domes.

There are time machines inside those domes. Sort of. An astronomer's brain is like a **TARDIS**. The astronomer sits in a perfectly ordinary chair, while her mind travels across the whole of time and space, seeking clues. Where did it all come from? How long have we got before the sun becomes a red giant and roasts

*Part of the observatory, seen from the summit. From left to right: The Automatic Transit Circle, the William Herschel Telescope (the large, white dome), Dutch Open Telescope, the Liverpool Telescope (with a dome like an armadillo), the Swedish Solar Tower, The Isaac Newton Telescope (the half-hidden dome) and the Jacobus Kapteyn Telescope.*

us? Can we find another friendly planet? Are we alone?

It's a slow process, totally unlike Hollywood science . It can take a year of work to produce one scientific paper, each of which is typically a tiny piece of the jigsaw puzzle. It might say, "Here are details of five new planets that we've discovered outside our solar systems." Or "This asteroid is rotating a little faster every year." Or, "We have about 5,000,000,000 years before the sun roasts the Earth, so don't worry."

But this slow process is cumulative. Since Galileo Galilei first looked through a telescope in 1609, astronomers have gradually pieced together a picture of how big the universe is, how it got here, and what's likely to happen to it eventually. Of course, there's always more to discover, and this is one of the places they're busy working on it.

Welcome to the Roque de Los Muchachos.