

“If someone from another galaxy asked where you live, how would you respond?”

By Christine Forbes

When I joined u3a Bromley, an Astronomy group was proposed. My previous astronomical experience consisted mainly of what I remembered from school. I was recently given Carl Sagan’s book *Pale Blue Dot*, which reignited my curiosity, so I enthusiastically joined the new group at which I volunteered to give one of the next presentations. After googling a bit I came across the term our **“Cosmic Address”** which I thought would be a useful topic to focus on and to provide a bit of context to the group, many of whom were beginner astronomers like me. I then discovered, after hours of YouTube videos and internet research, that I had rather more questions than answers to work from!

To begin with, finding a cosmic map with Earth on it proved surprisingly difficult. The universe is enormous, expanding and, inconveniently, we see everything in the past. Even sunlight takes eight minutes to reach us, so perhaps the ideal map would have four dimensions—including time!

One of the most interesting maps I came across was the Cosmic Microwave Background (CMB). Discovered in 1964 as a mysterious radio “hiss”, it is actually radiation dating from about 380,000 years after the Big Bang. It has travelled for roughly 13.8 billion years to reach us and provides amazing evidence about the age, expansion and shape of our universe. So although this map is not practically helpful in describing our current cosmic address, its implications led me to wonder what the limits of our cosmic address are...

Closer to home, modern telescopes such as Hubble, James Webb and DESI have mapped vast numbers of galaxies. The COSMOS-Web survey, for example, reveals nearly a million galaxies stretching back billions of years. These galaxies form enormous cosmic filaments surrounding huge voids. It was interesting to note that everything we can directly see makes up only about 5% of the universe. The rest is dark matter and dark energy. So, in cosmic terms, we are living in a rather poorly lit neighbourhood!

Then there are maps or diagrams that are much more familiar like those of our solar system and together with these, it is possible to begin to define our cosmic address and I briefly describe what could be the hierarchical components of our address below:

- **Earth** — there are now only eight planets orbiting the Sun, of which Earth is third.
- **The Solar System** — within which the Earth is surrounded by the Asteroid Belt as well as the Kuiper Belt further out and all within the Sun’s enormous Heliosphere or area of influence. The Solar System also resides within two vast regions of gas, the Local Interstellar Cloud of hydrogen and helium, which could be toxic to Earth if it weren’t for the Heliosphere and then the Local Bubble of radioactive material that is a star nursery and could have even helped to create life on Earth.
- **The Orion Spur** — a small offshoot of the Milky Way’s spiral structure, where our Sun is situated.

- **The Milky Way Galaxy** — a spiral galaxy with two large arms, containing hundreds of billions of stars and part of a group of 30 or so galaxies within the Local Galactic Group.
- **The Virgo Cluster** — the Milky Way resides in the Virgo Cluster of over 1,000 galaxies.
- **Laniakea Supercluster** — only defined in 2014, and make up of an immense web of more than 100,000 galaxies, influenced by the mysterious gravitational region known as the Great Attractor.
- **The Observable Universe** — a sphere roughly 93 billion light-years across containing everything scientists have been able to observe or detect.

And beyond that? Well, things get complicated. Our universe could be infinite or not and there are theories and hypotheses involving multiverses, bubble universes, parallel realities and extra dimensions – all way beyond my comprehension!

So, if an extraterrestrial ever asks for my address, I would hope the following would suffice!

Humanity
Earth, third planet of the Solar System
Orion Spur, Milky Way Galaxy
Virgo Cluster, Laniakea Supercluster
Observable Universe

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