

Fermi's Paradox (Where Are They?)

[Enrico Fermi](#) famously asked the question, "If there are intelligent extra-terrestrial (ET) beings out there, where are they, and why haven't we heard from them?" This question is often referred to as "[Fermi's Paradox](#)".

There are many proposed [solutions](#) to Fermi's Paradox, including the correct solution, which is that there actually are no ET's out there. In fact, Earth is the only location in the entire Universe that is capable of harboring intelligent life.

The evidence for this fact has been emerging from astronomical research over the last 10-20 years, the results of which has been compiled in books such as "[Rare Earth](#)" and "[Improbable Planet](#)". The evidence reveals that the entire Universe was used to configure hundreds or thousands of fine-tuned parameters to produce the environment on Earth that is capable of supporting advanced life forms. No other area of the Universe is configured to do this.

In our solar system, Earth is the only planet in the Sun's "habitable zone" (HZ), and it is the only planet with the proper concentrations of elements and molecules necessary for advanced life. Earth is also the only planet with the necessary geological cycles (water cycles, carbon cycle, etc.). The fine-tuning that was required to produce Earth's life-sustaining conditions are [so numerous and so exact](#) that it is prohibitively improbable (i.e. realistically impossible) for any other planet in the Universe to possess them.

For example, astronomers to date have identified at least 13 habitable zones ([HZ 1-11](#), [HZ 12-13](#)) within which a planet must reside for an extended period of time in order to support advanced life. But to date, astronomers have found only one planet that simultaneously resides in [more than two HZ's](#) of its host star, namely Earth.

Astronomers have also discovered [Galactic and Supergalactic Habitable Zones](#). Observations reveal that the Milky Way is the only galaxy in the Universe with a galactic habitability zone (GHZ). The Milky Way's GHZ is "a narrow distance range from the center of the galaxy where a star revolves around the center of the galaxy at virtually the same rate that the galaxy's spiral structure rotates". Since the Milky Way's GHZ is located in a ring around the center of the galaxy, it is conceivable that there could be other planetary systems in the Milky Way's GHZ that we have not observed yet. But this is prohibitively improbable, because the configuration of the Sun's HZ and the Earth's environment required that our solar system be formed near the center of the galaxy, and that some improbable event ejected the solar system from that position into the galaxy's GHZ. There is no evidence that an event like this occurred for any solar system other than our own.

In addition, the locations of small satellite galaxies to the Milky Way, which participated in the configuration of the GHZ, exhibit no symmetries that would indicate that another planetary system was configured similarly to the Sun's (e.g. on the opposite side of the galaxy).

Furthermore, the Milky Way exists within a very special cluster of galaxies (The Local Group), which itself exists within a very special supercluster of galaxies (The Laniakea Supercluster) the combined configurations of which were designed specifically to allow advanced life on Earth to exist and flourish for an extended period of time. (See: [How was the Earth Formed?](#))

A good summary of our current knowledge of the probabilities associated with ET intelligent life is given in [this Big Think article](#), based on a [paper](#) from the Future of Humanity Institute (FHI) at Oxford University. The results of the FHI analysis provide compelling detailed evidence that indeed we are "alone in the Universe".