An updated way to calculate the likelihood of the existence of extraterrestrial civilizations

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A small team of researchers from California Institute of Technology, NASA's Jet Propulsion Laboratory and Santiago High School has developed an updated version of an old equation to calculate the likely existence of extraterrestrial civilizations. The team has uploaded their paper to the arXiv preprint server.

Over the span of human history, many have wondered if life exists on other planets—intelligent or otherwise. As new tools have been applied to the question, many space scientists have become convinced that the likelihood of extraterrestrial civilizations developing seems more probable than not given all that has been learned. As other exoplanet systems have been found, many circling stars very similar to our sun, it has become difficult to find anything unique about our own planet to justify a belief that Earth alone ever produced life. In this new effort, the researchers have expanded on research done by Frank Drake back in 1961. He and his colleagues developed an equation (now known as the Drake equation) to calculate the odds of the existence of extraterrestrial civilizations—given all that was known about space and astronomical objects back then. The researchers factored in such variables as the number of believed exoplanets and star systems and how many of them were likely to be capable of supporting life.

Space scientists have learned a lot more about space and celestial objects since Drake's time—exoplanets have been observed, for example, some in their own Goldilocks zones, and scientists have learned more about the age of the universe and circumstances after the Big Bang. The researchers with this new effort took all the new factors into account and added something else not considered in 1961—the likelihood of other extraterrestrial civilizations arising and then unintentionally killing themselves off. Humans and other animals have a way of destroying their environment. Rats introduced to an island will eat every last scrap of food, for example, and then all of them will starve to death. Humans pump greenhouse gases into the atmosphere and confront a future in which the planet can no longer support life. The researchers suggest such evidence likely means that if extraterrestrial civilizations have arisen, most of them are probably gone by now due to their inability to prevent their own demise.

The result of the team's work is not an estimate of the likelihood of the

existence of extraterrestrial civilizations, but a new formula that others can use to make their own calculations based on what they believe to be true.

More information: A Statistical Estimation of the Occurrence of Extraterrestrial Intelligence in the Milky Way Galaxy, arXiv:2012.07902 [astro-ph.GA] arxiv.org/abs/2012.07902

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