# Term Project Proposal

Does life, specifically sapient, exist on other worlds? This is a question as old as antiquity, however, many scientists believe we should’ve had our answer long ago. Simply put, given the number of stars in the galaxy with planets, the quickness of life’s emergence on Earth, the believed commonality of conditions in which it arose, the rate of advancement of interstellar travel, and billions of years for unlikely probabilities to become certain: why didn’t humanity emerge in the middle of a galaxy-wide alien society? Where’s E.T.? This belief in sapience’s commonality derives largely from the *Drake Equation*:

This foundational equation sets out the probabilities not only for an alien civilization to arise, but to be contemporary with us. While many of the variables remain unknown, even by conservative estimates, there should be 1000 alien civilizations in the Milky Way, some of which would presumably broadcast their presence through the interstellar medium. For 40 years the *Search for Extraterrestrial Intelligence* has monitored the skies for radio signals, not unlike those our own species’ activities emit, and come up with nothing. Optical means have also failed to see dyson spheres, ringworlds, or any other megastructure that might show cosmic alien hands.

This is the Fermi Paradox. This is what we plan to investigate. First, we’ll explore the Drake Equation in detail; try to determine under what conditions life arose on Earth, and how likely we are to find these conditions on exoplanets. Clear areas to explore would be extremophiles, hydrothermal vents, and star systems like Trappist-1. Once we’ve explored life’s commonality, it’s important to determine any flaws or limitations in our current detection methods. How do receivers distinguish between artificial and naturally emitted signals? Maybe we just haven’t been looking long enough? And finally, assuming no significant errors in our search strategy, what are some “solutions” to the paradox? Scientists and speculators have puzzled over the problem for decades, coming up with myriad solutions, many of which are surprising, and potentially apocalyptic. What are great filters? and do they pose a threat to life on this planet? Are Von-Neumann probes scouring every planet? Is everyone keeping quiet on purpose? Or maybe, we’re just the first one’s at the party.