

Planetary Orbits and Their Chaos

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Abstract: The orbit of a planet holds a critical value in establishing whether that planet holds in the Habitable Zone. A Habitable Zone is defined as the region in a planet's orbit around a star where the planet can supposedly support life [1]. Recent collection in the data acquired from the Kepler spacecraft has confirmed the existence of over a billion planets in the Habitable Zone outside of our Solar System [2]. These Planets are changing their orbits ever so slightly and their effects on the neighbour planets lead to "chaos" in their own orbital alignments. Chaos Theory-a theory based on pattern of effects from a repetitive force, like a gravitational nudge to become a permanent change in the system's behaviour-has been used to define whether or not the orbit of a planet around a star undergoes significant change because of the gravitational pull of the other planets and how that change results in changes in a planet's morphology [3]. Even if the effect is not very drastic, since the orbit of a planet largely determines its climate, its geochemistry, the "chaos" can lead to climate variation which results in altering the possibility of life. The particular effect that has been studied is called a "mean motion resonance" and it comes into play when two planets' orbital periods are an integer ratio of each other.

References:

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