

Entanglement and Chameleon Acceleration

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Abstract

New Frontiers in Space Propulsion Science is a growing science, but has been progressing slowly over the last half century partly due to the difference between Einstein Physics and Quantum Physics, and more so to the incapability of propulsion engineers to understand both. To help resolve these differences, the Modified Chameleon Model was developed in an attempt to bring non-classical propulsion concepts into more focus for engineers. However, the Modified Chameleon Model still lacks a real connection between Einstein Physics and Quantum Physics even though the base model of Chameleon Cosmology crosses both. To further this along, this paper draws entanglement into Chameleon Cosmology and the Modified Chameleon Model through the work of Leonard Susskind, who lays the foundation that entanglement is the bridge between Einstein Physics and Quantum Physics. Follow this, a new form of the Modified Chameleon Model acceleration equation, referred to as Chameleon Acceleration, is discussed and examples of its application is presented.

Background. The Chameleon Acceleration equation was derived from a modification of Chameleon Cosmology, a gravity modification model published by Khoury and Weltman in 2004, converted to an acceleration model called the Modified Chameleon Cosmology Model by the author. Chameleon Cosmology is a density field model that *makes a small subtraction from gravity*, wherein, a thin-shell mechanism is used to mediate the subtraction from gravity with the thickness of an object's thin-shell being related to the density of the object and the density of the external environment (e.g., the density of the atmosphere). In Chameleon Cosmology, the thickness of the thin-shell is held static or unchanging as these densities about an object's thin-shell are unchanging. In the Modified Chameleon Cosmology Model, the density of an object is also unchanging unless the object is expelling mass to produce motion. Whereby, the expelled mass causes the density of the object to change, which changes the object's thin-shell thickness. However, since all objects in motion do not expel mass to while in motion, an object is said to have a density field that changes when it is in motion or when internal particulates in the object are in motion to cause change to the object's thin-shell thickness. Whereby, a change to the thin-shell thickness about an object is mediated by the acceleration of the object as a whole or by the accelerations of internal particulates, when the net acceleration of the particulates in the object is not zero, even when no mass is ejected. The thin-shell thickness about an object can be correlated to a warp bubble, but more specifically to the Natario explanation, which infers that the Alcubierre explanation may be misleading because the contraction and expansion actually refers to the relative motion of nearby members of the family of ADM observers. According to Natario, "one could best describe the warp drive spacetime as "sliding" the warp bubble region (or thin-shell about an object) through space; space in front of the bubble (thin-shell) may get contracted and space (thin-shell) behind it expanded, or not, depending on the details of the construction." Effectively, Chameleon Cosmology lays the foundation that a static warp bubble (*i.e.*, a thin-shell of energy) exist about all objects and the Modified Chameleon Cosmology model shows how the thin-shell naturally turns into a warp drive like model even at low velocities as an object accelerates. Most importantly, the Modified Chameleon Cosmology Model tells what parameters change the thin-shell thickness to induce acceleration *with or without* mass injection, and the Chameleon Acceleration equation tells us the amount of acceleration these parameters induce.

Solution. Thin-shell entanglement to an object and its environment densities provides the physics that allows non-Newtonian accelerations, *aka*, Chameleon Acceleration, which provides a solution toward the development of Space Drives without mass ejection.

Keywords. Entanglement, Chameleon Cosmology, Space Drive

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