

A Mechanism for Particle Acceleration in Space Plasmas and for Planetary Mass Accretion

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A newly defined mechanism for the acceleration of particles in a space plasma is presented. The mechanism is based on the transfer of energy from photons to particles via the Compton effect which produces the cosmological red shift. Extrapolation of this effect to long wavelengths in an Einstein static universe (modified only by the addition of a red shift) produces a similar mechanism for mass accretion in planetary sized bodies.

Introduction

The Compton effect interpretation of the cosmological red shift in conjunction with quantum electrodynamics results in a static universe consistent with the Einstein model (Kierein 1990). As pointed out by MacMillan (1918, 1925, Shlegel 1958), energy must be being converted into mass in this model. This paper examines the mechanism by which this could be occurring and shows how it can result in the acceleration of particles in a space plasma and, when extrapolated to longer wavelengths, how this mechanism also can result in mass accretion in planetary and other larger bodies.

Energy-to-mass Conversion Mechanism

To understand the energy-to-mass conversion mechanism, one must consider a free particle, such as an electron, in the rare space plasma between galaxies. This particle simultaneously sees photons coming from all directions and all wavelengths. The Compton transfer of energy to this particle from each photon produces the red shift. The particle increases in energy but does not increase correspondingly in velocity since most of the resultant velocities vectorially cancel. Special relativity requires that the particle must therefore increase in mass according to the famous equation $e = mc^2$.

The electron, for example, will increase in mass continuously and indefinitely so long as it is not disturbed by colliding with another particle (or a high energy gamma ray). The electron would be in a metastable state until it reached the mass of an electron plus a neutron; if it then collided with another particle, it would break into an electron plus a neutron. As these ever more massive metastable particles drift away from nearby bright sources towards the darker regions, they will begin to undergo ever more frequent collisions with each other. These collisions will cause the release of the energy (stored in the form of mass) that is above a stable state, resulting in the acceleration of particles in the space plasma. New radiating sources will be formed. Thus new galaxies are created as old ones die out. This is a newly defined method for the acceleration of particles in a space plasma.

Extrapolation to Long Wavelengths

Cosmological models that result from the Compton effect interpretation of the red shift are static universe models. Perhaps the best such model is the Einstein static universe model (Tolman 1934) with a non-doppler red shift incorporated. This model is finite and unbounded. In this model a photon can travel around the universe multiple times, each time being redshifted according to Hubble's law. This results in a universe with an isotropic cosmic background radiation

that extends spectrally to very long wavelengths. Such radiation has been detected at as long a wavelength as can be detected by radio astronomy (144 meters) by Reber (1968, 1977) at unexpectedly bright levels and probably extends to even longer wavelengths. Some have postulated that radiation pressure from such a penetrating radiation could cause a pushing force indistinguishable from gravity (Brush 1911). At shorter wavelengths Whipple (Whipple 1946) suggested that this so-called "mock gravity" is an important force for planetary formation. More recently, Hogan and White (1986) have suggested that mock gravity is an important force for galaxy formation.

The existence of this background radiation should cause larger bodies to increase in mass in an identical manner as the free particle case described in the previous section, especially when the wavelengths exceed the size of the body. The increase will be much slower and may be accompanied with internal heating. Bodies of a planetary size thus may gain hot cores and eventually grow into suns as Jupiter is doing.

This mechanism for planetary mass accretion, when applied to the earth, solves a problem long recognized by geologists. Continental drift is easily explained by an expanding earth. Many papers, books and conferences have been held on the subject of the expanding earth, (Lindemann 1927; Hilgenberg 1933, 1962; Carey 1958, 1976, 1988; Owen 1976; Egyed 1957;) but the idea that the earth is slowly expanding remains only a hypothesis in modern textbooks. The reason is not that the evidence for the expanding earth is lacking, but rather there has previously been no known physical law that would suggest any mechanism that could permit it to occur. Some speculation has been made by a leading expanding earth proponent that a steady-state cosmology, in which mass is somehow being created to keep the density of an expanding universe constant, could provide the mass accretion needed at the center of the earth and other planetary bodies to account for observations (Carey 1989). This speculation wants for a mechanism for the creation of mass from space expansion. The mechanism presented here is a direct conclusion of special relativity and does not need any new physics.

Acknowledgments and Dedication

This paper is dedicated to W. G. "Bill" Carnahan on the occasion of his 80th birthday. Bill is the founder of the Association for Pushing Gravity Research and author and

editor of many pamphlets on the subject of Lesagian theories of gravity. His creative approach and promotion of this subject has been most stimulating. Our relationship has continued for nearly 25 years. He can be contacted at APGR, 3204 Breeze Terrace, Austin, TX 78722

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