

A Purely Gravitational Model of the Universe

Thomas B. ANDREWS
tba@xoba.com

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Abstract

A gravitational model of the universe is studied assuming the universe is infinite, homogenous and in equilibrium. These assumptions are adopted as the simplest possible. The first two assumptions are reasonable and do not conflict with observations. However, the equilibrium assumption is inconsistent with the current expanding universe model. A strong argument for an equilibrium universe is based on the observed invariance of the physical constants. Assume the values of the physical constants are dependent on the interactions between particles. Then, it logically follows that the observed invariance of the physical constants is only possible if the universe is in an equilibrium state in which the interactions between particles, on average, remain the same.

The analysis of the model is based on a second order Taylor series expansion of the long range Newtonian potential between identical mass particles modified by an exponential gravitational shielding factor. The shielding factor was added specifically to eliminate the occurrence of infinite potentials and forces in an infinite universe. Note: Gravitational shielding is not predicted by either Newton's or Einstein's theory of gravitation. Nevertheless, a reduction in the sun's gravity at earth's surface was accurately measured during the March 9, 1997 eclipse of the sun. This measurement is considered definite evidence of gravitational shielding and justifies the use of gravitational shielding in cosmology.

The importance of gravitational shielding in cosmology is discussed next. It was discovered unexpectedly that gravitational shielding adds linear restoring forces to the gravitational model. With a linear restoring force (and the inertia force due to the mass of a particle), oscillating wave modes are supported in the universe instead of growing or decaying wave modes. Note: The discovery of linear restoring forces also solves the problem of how light as a wave propagates in empty space, an unresolved problem since Maxwell.

I show that the major features of the universe are reproduced by constructive interference between the wave modes. For constructive interference, the wave modes must be degenerate, i.e. have the same frequency, and oscillate with definite phase relations. Degenerate frequencies and definite phase relations tend to occur naturally in this gravitational model of the universe. For complete constructive interference, the universe is in an equilibrium state and the particle energy is minimized by the constructive interference.

The only observables in the universe are the objects and effects produced by complete interference between the wave modes. The underlying oscillating wave modes of the universe are not observable. For example, elementary particles are the squared interference peaks of the wave modes. Assuming a two-state system, the identical particles are split in energy by very large cross-product interference peaks, thus changing

the identical particles into protons and electrons. The electro-static force (including the “plus and minus” charge effects) and, by extension, the electromagnetic field is an accompanying effect of this split. Finally, gravitational shielding produces gravitational potentials between local and distant particles depending exponentially on the distance. These potential differences, analogous to changes in the earth’s gravitational potential with height above the earth, produce the observed Hubble redshift.