Review of: "Properties of elementary particles, dark matter, and dark energy"

Douglas Eardley[1]

1 University of California, Santa Barbara

Potential competing interests: No potential competing interests to declare.

This paper presents a method based in integer arithmetic and Diophantine equations to formulate many of the fundamental laws of physics. Spacetime fields are not used; instead, new internal quantum numbers for elementary particles are proposed, including the "isomer". A principle "Conservation of Degrees-of-Freedom Related Aspects" is proposed to correspond the new particles with known ones of the Standard Model. Both known particles and hypothetical dark-matter particles have various values of isomer. A new massless scalar particle, the "Jay", is proposed.

The paper points out an approximate ratio among the experimentally known mass-squared of the W-boson, Z-boson and Higgs boson as 7:9:17, which could be tested by more accurate measurement of these masses. Some neutrino masses are predicted. It also predicts certain properties of dark-matter particles, and predicts ratios of certain physical parameters of known particles to those of dark-matter particles.

The paper also comments on galaxy formation and cosmology, and predicts some novel mechanisms.

The paper is reasonably well written, but wordy at times. Many new terms are defined and used, so that the reader must read it carefully to follow the arguments. Some results could perhaps be better presented as equations or tables, instead of text.

This paper sets out a new direction for the study of fundamental physics based on discrete variables. It can be recommended for publication.