Interpretations of Einstein's Equation E=mc2

Flores, F. J. (2005) Interpretations of Einstein's Equation E=mc2.

Abstract

Interpretations of Einstein ' s equation differ primarily concerning whether E = mc2 entails that mass and energy are the same property of physical systems, and hence whether there is any sense in which mass is ever " converted " into energy (or vice versa). In this paper, I examine six interpretations of Einstein ' s equation and argue that all but one fail to satisfy a minimal set of conditions that all interpretations of physical theories ought to satisfy. I argue that we should prefer the interpretation of Einstein ' s equation that holds that mass and energy are distinct properties of physical systems. This interpretation also carries along the view that while most cases of " conversion " are not genuine examples of mass being " converted " into energy (or vice versa), it is possible that the there are such " conversions " in the sense that a certain amount of mass " appears " and an equivalent of mass " disappears. " Finally, I suggest that the interpretation I defend is the only one that does not blur the distinction between what Einstein called " principle " and " constructive " theories. This is philosophically significant because it emphasizes that explanations of Einstein ' s equation and the " conversion " of mass and energy must be top-down explanations.

Keywords:	mass-energy, mass, energy, E=m, E=mc2
Subjects:	Specific Sciences: Physics: Relativity Theory
ID Code:	2515
Deposited By:	Flores, F
Deposited On:	10 November 2005
Additional Information:	Forthcoming in International Studies in the Philosophy of Science