Abstract Submitted
for the TSF06 Meeting of
The American Physical Society

Role of analyticity and covariance in determining laws of mechanics JOHN FRY, ZDZISLAW MUSIELAK, L.D. SWIFT, University of Texas at Arlington — We impose two postulates for state functions in our universe and use them to obtain dynamical equations of mechanics for isolated elementary particles. The first postulate is that the state function is analytic on its carrier space. The second postulate is that any equation defining the state function must be written in covariant form for the metric of its carrier space. This implies Wigner's definition of an elementary particle, which we adopt. Using a Minkowski metric we obtain equations for isolated elementary particles which resemble the Dirac and Klein-Gordon equations. We introduce a quantum action operator and observe that the state function must be an eigenfunction of the operator. It must have eigenvalue $\hbar$ to obtain the quantum theory of our universe. We identify the origin of Hamilton's principle for quantum systems as a consequence of the first two postulates and the definition of a particle. Dynamical equations in non-relativistic and classical limits will also be discussed.

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Date submitted: 12 Sep 2006 Electronic form version 1.4