

Abstract Submitted  
for the APR07 Meeting of  
The American Physical Society

**Fractional dynamics and the TeV regime of field theory** ERVIN GOLDFAIN, Welch Allyn Inc., Photonics CoE — The description of complex dynamics in the TeV regime of field theory warrants the transition from ordinary calculus on smooth manifolds to fractional differentiation and integration. Starting from the principle of local scale invariance, we explore the spectrum of phenomena that is likely to emerge beyond the energy range of the standard model. We find that, in the deep ultraviolet region of field theory, a) fractional dynamics in Minkowski space-time is equivalent to field theory in curved space-time. This result points out to a natural integration of classical gravity in the framework of TeV physics; b) the three gauge groups of the standard model are rooted in the topological concept of fractional dimension. This result suggests that gauge bosons and fermions are unified through a fundamentally different mechanism than the one advocated by supersymmetry; c) fractional dynamics is the underlying source of parity violation in weak interactions and of the breaking of time-reversal invariance in processes involving neutral kaons. Note: this work is available at [doi:10.1016/j.cnsns.2006.06.001](https://doi.org/10.1016/j.cnsns.2006.06.001)

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Date submitted: 02 Jan 2007

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