



# PPD Seminar

## Unification? It's Only a Matter of Time

**David Jackson (Independent)**

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Physicists investigate the empirical properties of matter within space and time while seeking a unified theoretical basis for its structure. Three key targets for unification are: explaining the Standard Model's multiplet structure, integrating gravitation with quantum theory, and identifying candidates for dark matter and dark energy in cosmology. Some approaches to unification postulate elementary 'material' entities such as particles, fields or strings distributed in a background spacetime, sometimes with extra spatial dimensions, while in other unification schemes the geometric properties of additional dimensions of space are themselves proposed to account for observed properties of matter, as for the original theory of Kaluza and Klein. Here we describe a further possible conceptual foundation and construction in which the continuous flow of time can itself alone provide a simple and unique unifying basis for both 4-dimensional spacetime and the matter it accommodates, by generalising the familiar local quadratic form for proper time to higher-order expressions. Focussing upon the core arguments, we describe how this seemingly overlooked time-based approach to unification is not only indeed possible but also implies a very direct connection with each of the above three recognised physics targets for unification. In each case we summarise the status of the development of the theory, the open questions and the potential observable implications.

Suggest a Speaker



All Welcome

