Quantum Physics

# de Broglie waves as the "Bridge of Becoming" between quantum theory and relativity

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It is hypothesized that de Broglie's 'matter waves' provide a dynamical basis for Minkowski spacetime in an antisubstantivalist or relational account. The relativity of simultaneity is seen as an effect of the de Broglie oscillation together with a basic relativity postulate, while the dispersion relation from finite rest mass gives rise to the differentiation of spatial and temporal axes. Thus spacetime is seen as not fundamental, but rather as emergent from the quantum level. A result by Solov'ev which demonstrates that time is not an applicable concept at the quantum level is adduced in support of this claim. Finally, it is noted that de Broglie waves can be seen as the "bridge of becoming" discussed by Elitzur and Dolev (2005).

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| Comments: | Forthcoming in Foundations of Science; reference added to recent work of Dolce |
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