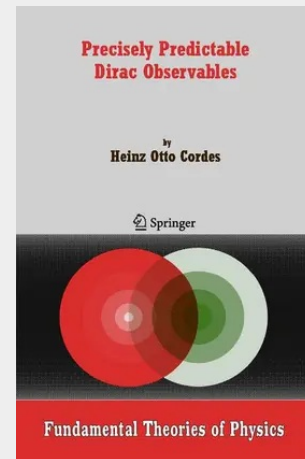


Precisely Predictable Dirac Observables

In this book we are attempting to offer a modification of Dirac's theory of the electron we believe to be free of the usual paradoxes, so as perhaps to be acceptable as a clean quantum-mechanical treatment. While it seems to be a fact that the classical mechanics, from Newton to Einstein's theory of gravitation, offers a very rigorous concept, free of contradictions and able to accurately predict motion of a mass point, quantum mechanics, even in its simplest cases, does not seem to have this kind of clarity. Almost it seems that everyone of its fathers had his own wave equation. For the quantum mechanical 1-body problem (with vanishing potentials) let us focus on 3 different wave equations: (I) The Klein-Gordon equation $\Delta \psi + (1 - \psi^2) \psi = 0$, $\Delta = \text{Laplacian} = \sum_{j=1}^3 \partial^2 / \partial x_j^2$. This equation may be written as $(\partial^2 / \partial t^2 - \Delta) \psi = 0$. Here it may be noted that the operator $\partial^2 / \partial t^2 - \Delta$ has a well-defined positive square root as unbounded self-adjoint positive operator of the Hilbert space $H = L^2(\mathbb{R}^3)$.

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106,99 €

99,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9781402051685

Medium: Buch

ISBN: 978-1-4020-5168-5

Verlag: Springer Netherlands

Erscheinungstermin: 18.10.2006

Sprache(n): Englisch

Auflage: 2007

Serie: Fundamental Theories of Physics

Produktform: Gebunden

Gewicht: 600 g

Seiten: 269

Format (B x H): 160 x 241 mm

