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Mathematical Physics

Semidirect Product of Groupoids, Its Representations and Random Operators

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One of pressing problems in mathematical physics is to find a generalized Poincar\'e symmetry that could be applied to nonflat space-times. As a step in this direction we define the semidirect product of groupoids $\Gamma_0 \rtimes \Gamma_1$ and investigate its properties. We also define the crossed product of a bundle of algebras with the groupoid Γ_1 and prove that it is isomorphic to the convolutive algebra of the groupoid $\Gamma_0 \rtimes \Gamma_1$. We show that families of unitary representations of semidirect product groupoids in a bundle of Hilbert spaces are random operators. An important example is the Poincar\'e groupoid defined as the semidirect product of the subgroupoid of generalized Lorentz transformations and the subgroupoid of generalized translations.

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