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Section:

11. Mathematical Physics

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Feynman Path Integral, Umbral Claculus, and Non-Commutative Combinatorics
There are a lot of similar patterns in different areas of science. For example, the Feynman path integral in quantum mechanics and umbral calculus in combinatorics share many similar properties:
1. They provides an effective transition from relatively tractable classic language to more complicated quantum/combinatorial case.
2. The technique is not a formalism but merely a symbolism, namely the suggestive notations (not formal rules) form the contents of the method.
3. The approach is not an algorithm but a guide, which should be adjusted to need of every concrete problem.
4. A rigor mathematical basis was absent for a while.
We demonstrate that the similarity is not just a coincidence. In fact the Feynman path integral could be viewed as an umbral calculus for non-commutative combinatorics.
Reference Vladimir V. Kisil. The umbral calculus: a model from convoloids. page 25, 1997. E-print: funct-an/9704001.