Quantum Levy walks

V. Potoček
FNSPE, Czech Technical University in Prague

Quantum walks form an interesting paradigm for quantum computing, which has been appreciated mainly for the faster spreading than classical random walks allow. On the other hand, in the classical theory one can meet so-called Levy random walks, which, by relaxing the condition on the locality of the steps, also have interesting spreading and hitting properties. Recently, Levy walks have been shown to be optimal for searching for sparse samples in 2D, and they have been observed to be used for this purpose in real natural processes. In this talk, we propose a novel concept of Quantum Levy Walks, obtained by combining of the two above enhancements of a random walk. We define a quantum Levy walk on an infinite line and on a circle and discuss their basic properties. We briefly address the potential uses of this theory.