ON ANOMALOUS QUANTUM WAVES

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The scientific literature has produced many examples of the phenomenon known as anomalous diffusion, where particles don't behave/move "normally". We wish to model anomalous quantum wave behavior in the Fractional-in-Time Superdiffusive Nonlinear Schrödinger Equation (F-SNLS). This equation will serve as a proper interpolation between the nonlinear Schrödinger equation and the Klein-Gordon Wave equation by making use of nonlocal fractional time derivative operators of order between 1 and 2. While interpolating between the Schrödinger Equation and the Wave Equation, the F-SNLS will exhibit wave-like behavior but enjoy none of the usual behaviors expected such as conserved quantities or a evolution group property. In this talk, we introduce the fractional time derivative, the F-SNLS, expose the well-posedness theory for the inhomogenous problem, and explore recent results and obstacles in the associated interior control problem. If time allows, we will discuss possible implications in the study of memory and numerics.