Dynamic law of large numbers for quantum stochastic filtering and related new nonlinear stochastic Schrodinger equations

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As a far reaching extension of the quantum large number limit leading to the basic nonlinear Schrodinger equations, we derive the new nonlinear stochastic Schrödinger equations, as the limits of continuously observed and controlled systems of a large number of interacting quantum particles, evolving according to the Belavkin quantum filtering equation. This construction is a starting point for the quantum extension of the theory of quantum mean-field games. Our introduction of a new class of equations suggests many open problems concerning e.g. existence, uniqueness, regularity, etc. Ideas of the talk are taken from the papers

[1] Vassili N. Kolokoltsov. *The law of large numbers for quantum stochastic filtering and control of many particle systems.* Theoretical and Mathematical Physics. 2021. Vol. 208, no. 1. P. 97-121.

[2] Vassili N. Kolokoltsov. *Quantum mean field games.* Annals Applied Probability. 2022. Vol. 32, no. 3. P. 2254 - 2288.

[3] Vassili N. Kolokoltsov. *Continuous time random walks modeling of quantum measurement and fractional equations of quantum stochastic filtering and control.* Fractional Calculus and Applied Analysis. 2022. Vol. 25. P. 128 - 165.

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