Quantum white noise calculus provides a framework for the study of operators on (Boson) Fock space, where classical stochastic analysis and quantum theory encounter. Let $\Gamma(H)$ be the Fock space over a Hilbert space H, say, $L^2(\mathbb{R}^n)$. By means of white noise triple $\mathcal{W} \subset \Gamma(H) \subset \mathcal{W}^*$, where $\mathcal{W}$ is a countably Hilbert nuclear space densely and continuously embedded in $\Gamma(H)$, the annihilation and creation operators at a point $\{a_t, a_t^* ; t \in T\}$ are formulated as continuous operators. It is known that a general white noise operator $\Xi \in \mathcal{L}(\mathcal{W}, \mathcal{W}^*)$ is expressible as a function of quantum white noises (Fock expansion theorem). In this line we have developed the concept of quantum white noise derivatives and the theory of differential equations characterizing white noise operators. In this talk we will discuss some of the recent achievements and questions, and relevant topics in complex white noise.

These works are based on the long-term collaboration with Un Cig Ji (Chungbuk National University, Korea).

[1] Un Cig Ji and Nobuaki Obata: Quantum white noise calculus and applications, in "Real and Stochastic Analysis: Current Trends (Malempati M Rao, Ed.), Chapter 4," pp. 269-353, World Scientific, 2014.

[2] Un Cig Ji and Nobuaki Obata: A book in preparation.