Hida distribution construction of indefinite metric $(\phi^p)_d$ $(d \geq 4)$ quantum field theory.

Sergio Albeverio * and Minoru W. Yoshida †

December 12, 2013

Abstract.
Firstly, we review the indefinite metric quantum field models defined through *white noise* and *Hida distributions* given by [AGW1,2] and [GrS]. Also, review the structures of usual Euclidean quantum field formulations given by [N] and [Si].

Secondly, we introduce a new system of "Schwinger functions" which corresponds to a $(\phi^p)_d$ $(d \geq 4)$ Euclidean quantum field theory. Where, p can be taken not only as an even number but also an odd number. The system of "Schwinger functions" does not satisy the property of reflection positivity, but satisfies all the other O-S axioms, which are defined through the *Hida distributions*.

Finally, we discuss an analytic continuation of the system of "Schwinger functions" to a system of "Wightman functions" satisfying the *modified Wightman axioms*.

References

[AGW1] Albeverio, S., Gottschalk, H., Wu, J.-L., Convoluted generalized white noise, Schwinger functions and their analytic continuation to Wightman functions, *Rev. Math. Phys.* **8** (1996) 763-817.

[AGW2] Albeverio, S., Gottschalk, H., Wu, J.-L., Models of local relativistic quantum fields with indefinite metric (in all dimensions), *Comm. Math. Phys.* **184** (1997), 509-531.

[AY] Albeverio, S., Yoshida, M.W. : Hida distribution construction of non-Gaussian reflection positive generalized random fields, *Infinite Dimensional Analysis, Quantum Probability and Related Topics.* **12** (2009) 21-49.

[GrS] Grothaus, M., Streit, L., Construction of relativistic quantum fields in the framework of white noise analysis, *J. Math. Phys.* **40** (1999) 5387-5405.

[HKuPS] Hida,T., Kuo, H.-H., Potthoff, J., Streit, L.: *White Noise, An Infinite Dimensional Calculus*, Kluwer Acad. Publ., Boston, 1993.

[N] Nelson, E., Construction of quantum fields from Markoff fields, *J. Functional Analysis* **12** (1973) 97-112.

[Si] Simon, B.: *The $P(\Phi)_2$ Euclidean (Quantum) Field Theory*, Princeton Univ. Press, Princeton, NJ., 1974.

*Inst. Angewandte Mathematik, Universität Bonn
†Dept. Math. Tokyo City Univ.