Scalar fields in p-adic QFT

J. A. Vallejo and M. L. Mendoza

ABSTRACT

The talk aims to show the construction of a family of quantum scalar fields over a $p-$adic spacetime which satisfy $p-$adic analogues of the Gårding–Wightman axioms, this $p-$adic scalar fields satisfy certain $p-$adic Klein-Gordon pseudo-differential equations. We compute explicitly the fundamental solutions of these equations, we also present the second quantization of the solutions of these Klein-Gordon equations which corresponds exactly to the scalar fields introduced. Most of the axioms can be formulated the same way in both, the Archimedean and non-Archimedean frameworks; however, the axioms depending on the ordering of the background field must be reformulated, reflecting the acausality of $p-$adic spacetime. The main conclusion is that there seems to be no obstruction to the existence of a mathematically rigorous quantum field theory (QFT) for free fields in the $p-$adic framework, based on an acausal spacetime.

References

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