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New advances in Quantum Field Theory in two-dimensions.

In this talk we revisit some unsolved problems of Quantum Field Theory, in particular, the canonical quantization of two-dimensional non-linear sigma models (NLSM) in two dimensions. On the example of the O(3) NLSM and its one-parameter deformation — the sausage model, we show how the long-standing "non-ultralocality" problem can be resolved. Our consideration is based on the continuous version of the the Quantum Inverse Scattering Method enhanced by a powerful ODE/IQFT correspondence, which connects stationary states of Integrable QFT models with special solutions of classical integrable equations. This approach leads to new efficient methods for computation of vacuum eigenvalues of the continuous analogs of quantum transfer-matrices in QFT. We also discuss the emergence of the Yang-Baxter Poisson algebra in other non-ultralocal systems related to the Principal Chiral Field models.