

# Chern-Simons Research Lecture Series

## Correlation functions in integrable Quantum Field Theory

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### Location

**Tuesday, September 27:** 3:00-5:00pm 736 Evans

**Thursday, September 29:** 3:00-4:00pm 891 Evans

**Friday, September 30 :** 2:00-4:00pm 891 Evans

**Tuesday, October 3:** 1:00-3:00pm 891 Evans

### Abstract:

These lectures summarize results of study of integrable models of the Quantum Field Theory (QFT) in two space-time dimensions.

There are more or less the only relativistic models local models in quantum field theory where exact, non-perturbative formulation exists and many quantities can be computed explicitly. In the lectures the main example will be sine-Gordon (sG) model. This model is related to the  $c=1$  Conformal Field Theory (CFT) and to the six vertex model in statistical mechanics. This relation and its consequences will be explained.

The lectures will start with an introduction to Minkowski formulation of quantum field theory (QFT) explaining factorable S-matrices and form factors. Then we will focus on the relation between the short distance behavior of two-point correlation functions in the sG model and correlation functions in corresponding CFT.

After this we will discuss the relation between Euclidean QFT and lattice models of 2D statistical physics. Using the fermionic description of the space of local operators for the six vertex model and passing to the scaling limit new way of describing the CFT which is compatible with the integrable perturbation will be introduced. This material is based on recent works by Boos, Jimbo, Miwa, Takeyama and FS. In particular, these results allow to compute the one-point functions for sG model explicitly and solve the problem of describing the short-distance behavior of correlation functions.