



NYU | COURANT

Spring 2016 Lecture Series

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The second half of the 20th century saw the convergence of Statistical Mechanics and Quantum Field Theory. In two dimensions, this convergence resulted in the most beautiful chapters of mathematical physics: Conformal Field Theory (CFT) reveals deep structures that allow for extremely precise investigations, yielding in particular non-perturbative descriptions with exact formulae.

This series will explain how 2D CFT works, in particular how planar lattice models can be understood using the Minimal Models of CFT. While this connection remains largely conjectural, major recent progress in the field of rigorous conformal invariance allows one to make mathematical sense of much of the story: In particular, for the Ising model we are close to reaching a complete understanding of how it works. The series will thus focus on giving an intuitive understanding of the global picture (in a probabilistic language) together with concrete examples, precise definitions and rigorous statements whenever they are available.

April 22, 2-3:30pm: General picture: local fields, correlations, partition functions.
Room 517 Examples of models and of exact results coming from CFT.

April 29, 4-6pm: Fields and geometry: the stress-energy tensor, conformal symmetry, central charge, Virasoro commutation relations, unitarity, boundaries.

May 6, 4-6pm: Virasoro algebra representation theory: Kac determinant formula, classification of Virasoro representations, null-field equations, differential equations.

May 13, 2-4pm: Minimal models: unitary series, fusion rules, partition functions, explicit constructions.

May 20, 2-4pm: Beyond conformal invariance: massive theories, counting arguments, exact scattering matrices.

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