



THE UNIVERSITY OF
CHICAGO

Department of Statistics

STATISTICS COLLOQUIUM

LIN LIN

Department of Mathematics
University of California, Berkeley

Feynman Diagrams, Luttinger-Ward Formalism,
and Gibbs Measure

TUESDAY, APRIL 9, 2019 at 11:00 AM
Kent 120, 1020 E. 58th Street

ABSTRACT

Many-body perturbation theory (MBPT) is widely used in quantum physics, chemistry, and materials science. At the heart of MBPT is the Feynman diagrammatic expansion. However, for quantum many-body problems, many developments of MBPT are only formally valid. This shortcoming raises both theoretical and practical questions. By exploring the correspondence between the Feynman diagrammatic expansion and a certain class of Gibbs measures, we provide a relatively concise and self-contained introduction to MBPT. This requires no more knowledge a priori than basic knowledge of multivariable calculus, combinatorics and convex analysis. We demonstrate that the resulting models yields diagrammatic expansion that can provide useful insights toward the rigorous understanding of certain topics in MBPT, such as the existence of the Luttinger-Ward functional, and the rigorous justification of the bold Feynman diagrammatic series for the first time.

(Joint work with Michael Lindsey)

For further information and inquiries about building access for persons with disabilities, please contact Jonathan Rodriguez at 773.702.8333 or send him an email at jgrodriquez@galton.uchicago.edu. If you wish to subscribe to our email list, please visit the following website:
<https://lists.uchicago.edu/web/subscribe/statseminars>.