

PART II

FUNCTION SPACE INTEGRALS

Part II provides a self-contained construction of certain non-Gaussian measures on function space. The examples satisfy the axioms of Chapter 6 and yield nonlinear quantum fields. The material is developed in logical order. Conceptual topics of broad interest are interspersed with technical material special to this construction. The material of broader interest concerns Feynman diagrams, perturbation theory, and calculus on path space. It is located at the beginnings of Chapters 8–10 and can be read independently of the rest of Part II. Some aspects of the construction given here are technically new, especially the use of nonsymmetric multiple reflections in Chapters 10 and 12.

The technical estimates of Part II are developed for $P(\phi)_{d=2}$ boson interactions. The vacuum energy estimates (Chapter 8) have been extended with renormalization to $\phi_{d=3}^4$ and Yukawa $_{d=2,3}$ models. Formally they hold for all super-renormalizable interactions. The remaining methods presented in Part II—multiple reflections and monotonicity—are dimension independent. The multiple reflection methods, as well as estimates uniform in the volume of interaction, also extend to particles with spin. But monotonicity properties and the proof of convergence of the infinite volume limit (e.g., properties based on correlation inequalities) are spin dependent. In Chapter 18 we establish the convergence of the infinite volume limit for certain values of the coupling constants by an alternative method which is independent of spin.