Sznitman, Alain-Sol
Topics in occupation times and Gaussian free fields. (English) | Zbl 1246.60003 |
Zurich Lectures in Advanced Mathematics. Zürich: European Mathematical Society (EMS) (ISBN 978-3-03719-109-5/pbk). vii, 114 p. (2012).

The book provides links between occupation times, Gaussian free fields, Poisson gases of Markovian loops and random interlacements. It contains 4 chapters.

Chapter 1 describes the general framework which is used for the most parts of the book. Finite weighted graphs with killing and the associated continuous-type Markov chains $X_.$, with constant jump rate equal to 1, and $\overline{X}_.$, with variable jump rate, are introduced. Also, various notions related to Dirichlet forms and potential theory are given. In chapter 2, isomorphism theorems of Dynkin and Eisenbaum, as well as some of the so called generalized Ray-Knight theorems are discussed. The Gaussian free field and measures on paths entering the Dynkin isomorphism theorem are introduced. Chapter 3 is devoted to the measure describing a Markovian loop. First, rooted (or based) loops as well as pointed loops are discussed. Markovian loops arise as unrooted loops, which live in the space of rooted loops modulo time-shift. In chapter 4, the Poisson point process on the space of unrooted loops with intensity measure $\alpha\mu$, with α a positive number, is studied. In particular, the occupation field of this gas of loops is related to the Gaussian free field and Symanzik's representation formula is proved. At the end of the chapter, several precise meanings for the notion of "loops going through infinity" are explored and related to random interlacements.

Reviewer: Utkir Rozikov (Tashkent)

MSC:

60-01	Introductory exposition (textbooks, tutorial papers, etc.) pertaining to probability theory
60G15	Gaussian processes
60J27	Continuous-time Markov processes on discrete state spaces
60K35	Interacting random processes; statistical mechanics type models; percolation theory
82B41	Random walks, random surfaces, lattice animals, etc. in equilibrium statistical mechanics

Cited in **3** Reviews
Cited in **29** Documents

Keywords:

occupation times; Gaussian free field; Markovian loop; random interlacements

Full Text: DOI