Contents

| Preface | | ix |
|--|--|-------------|
| | r 1. Basics on large deviations Gärtner-Ellis theorem | 1 1 8 |
| | 0 | |
| 1.3. | | 19 |
| 1.4. | Notes and comments | 22 |
| Chapte | r 2. Brownian intersection local times | 25 |
| 2.1. | | 25 |
| 2.2. | | 27 |
| | Self-intersection local time | 42 |
| 2.4. | Renormalization | 48 |
| 2.5. | Notes and comments | 53 |
| Chapte | r 3. Mutual intersection: large deviations | 59 |
| 3.1. | High moment asymptotics | 59 |
| 3.2. | | 67 |
| 3.3. | | 77 |
| 3.4. | Notes and comments | 84 |
| Chapter 4. Self-intersection: large deviations | | 91 |
| - | Feynman-Kac formula | 91 |
| | One-dimensional case | 102 |
| | Two-dimensional case | 111 |
| 4.4. | Applications to LIL | 121 |
| | Notes and comments | 126 |
| Chapte | r 5. Intersections on lattices: weak convergence | 133 |
| 5.1. | Preliminary on random walks | 133 |
| 5.2. | Intersection in 1-dimension | 139 |
| 5.3. | | 145 |
| 5.4. | | 160 |
| 5.5. | | 164 |
| 5.6. | 8 | 171 |
| Chapte | r 6. Inequalities and integrabilities | 177 |
| | Multinomial inequalities | 177 |
| 6.2. | | 187 |
| 6.3. | | 191 |
| 6.4. | Integrability of Q_n and R_n in high dimensions | 198 |
| | | |

CONTENTS

| 6.5. | Notes and comments | 204 |
|---|---|-----|
| Chapte | r 7. Independent random walks: large deviations | 207 |
| 7.1. | Feynman-Kac minorations | 207 |
| 7.2. | Moderate deviations in sub-critical dimensions | 222 |
| 7.3. | Laws of the iterated logarithm | 226 |
| 7.4. | What do we expect in critical dimensions? | 230 |
| 7.5. | Large deviations in super-critical dimensions | 231 |
| 7.6. | Notes and comments | 247 |
| Chapter 8. Single random walk: large deviations | | 253 |
| 8.1. | Self-intersection in one dimension | 253 |
| 8.2. | Self-intersection in $d = 2$ | 257 |
| 8.3. | LDP of Gaussian tail in $d = 3$ | 264 |
| 8.4. | LDP of non-Gaussian tail in $d = 3$ | 270 |
| 8.5. | LDP for renormalized range in $d = 2, 3$ | 278 |
| 8.6. | Laws of the iterated logarithm | 287 |
| 8.7. | What do we expect in $d \ge 4$? | 289 |
| 8.8. | Notes and comments | 291 |
| Appendix | | 297 |
| А. | Green's function | 297 |
| В. | Fourier transformation | 299 |
| С. | Constant $\kappa(d, p)$ and related variations | 303 |
| D. | Regularity of stochastic processes | 309 |
| Е. | Self-adjoint operators | 313 |
| Bibliography | | 321 |
| List of General Notations | | 329 |
| Index | | 331 |

viii