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Participants are lodged and work in the same building, a former seminary built in the 18th century in the city of Saint-Flour, at an altitude of 900 m. The pleasant surroundings facilitate scientific discussion and exchange.

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Preface

The first part of the notes reviews several coarse geometric concepts. We will then move on and look at the manifestation of the underling geometry in the behavior of random processes, mostly percolation and random walk.

The study of the geometry of infinite vertex transitive graphs and Cayley graphs in particular is rather well developed. One goal of these notes is to point to some random metric spaces modeled by graphs that turn out to be somewhat exotic. That is, admitting a combination of properties not encountered in the vertex transitive world. These include percolation cluster on vertex transitive graphs, critical clusters, local and scaling limits of graphs, long range percolation, CCCP graphs obtained by contracting percolation clusters on graphs, and stationary random graphs including the uniform infinite planar triangulation (UIPT) and the stochastic hyperbolic planar quadrangulation.

Chapter 5 is due to Nicolas Curien, Chap. 12 was written by Ariel Yadin, and Chap. 13 is joint work with Gady Kozma.

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Some of the proofs will only be sketched, or left as exercises to the reader. References to where proofs can be found in full detail are given throughout the text. Exercises and open problems can be found in most sections.

Excellent sources covering related material are Lyons with Peres [Lyo09], Pete [Pet09], Peres [Per99], and Woess [Woe05].

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