

Percolation (reading course)

18 luglio 2017

In this reading course we focus on bond percolation, trying to cover several chapters of Grimmett's book "Percolation", Springer Verlag (at least the first 8 chapters).

Past and forthcoming meetings:

1. June 28, 15-18, Room B.
2. June 30, 15-18, Office 5
3. July 3, 14.30 - 17.30, Room B
4. July 7, 14.30 - 17.30, Room B
5. July 10, 15-18, Room B
6. July 13, 15-18, Room B
7. July 14, 10-13, Room B
8. July 17, 15-18, Room B
9. July 18, 14.30-18 Room B
10. July 19, 15-19 Room B.

Covered material¹:

- Chapter 1: Bond percolation, universal coupling, partial order on the configuration space, increasing events, percolation probability, critical probability.
- Chapter 2: Section 2.1, Section 2.2 (FKG inequality), Section 2.3 (BK inequality: no proof), Section 2.4 (Russo's formula), Section 2.6 (inequality concerning the interior part of a set)
- Chapter 3: Section 3.3, definition of enhancement, essential enhancement, monotonic enhancement, statement of Theorem 3.16, application of Thm.3.16 to deduce that the critical probability for the triangular lattice is strictly smaller than the critical probability for \mathbb{Z}^2 . Proof of Thm. 3.16
- Chapter 4: function $\kappa(p)$ (number of open clusters per vertex), Thm 4.2., Section 4.2 on lattice animals, Section 4.3 (differentiability of κ)

¹If not stated otherwise thms, lemmas, props are discussed and proved

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- Chapter 5: Section 5.1 (the mean cluster size), Section 5.2 (Theorem (5.4) on the exponential tail decay of the radius of an open cluster for $p < p_c$ and Theorem (5.8) on the linear lower bound of the percolation probability $\theta(p)$ for $p > p_c$). Note: we have discussed Menshikov's proof of Thm. 5.4 and not the one of Aizenmann and Barsky (hence no Section 5.3)
 - Chapter 6: the entire chapter
 - Chapter 7: Section 7.1, Section 7.2