Phase Transition for Activated Random Walk Models

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joint with:

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Gibbs Measures and Phase
Transitions on Sparse Random Graphs

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Introduction to Metastability

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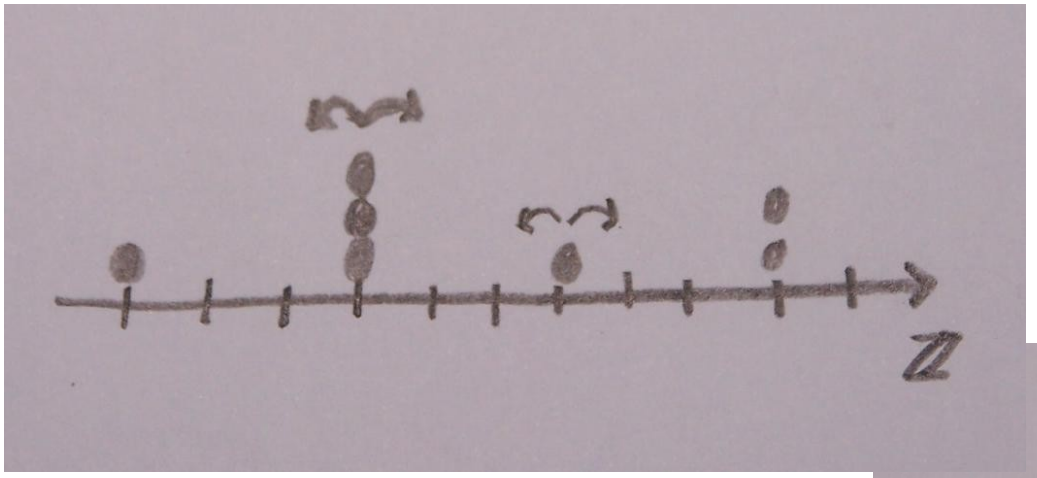
Conservative interacting particle system on the lattice



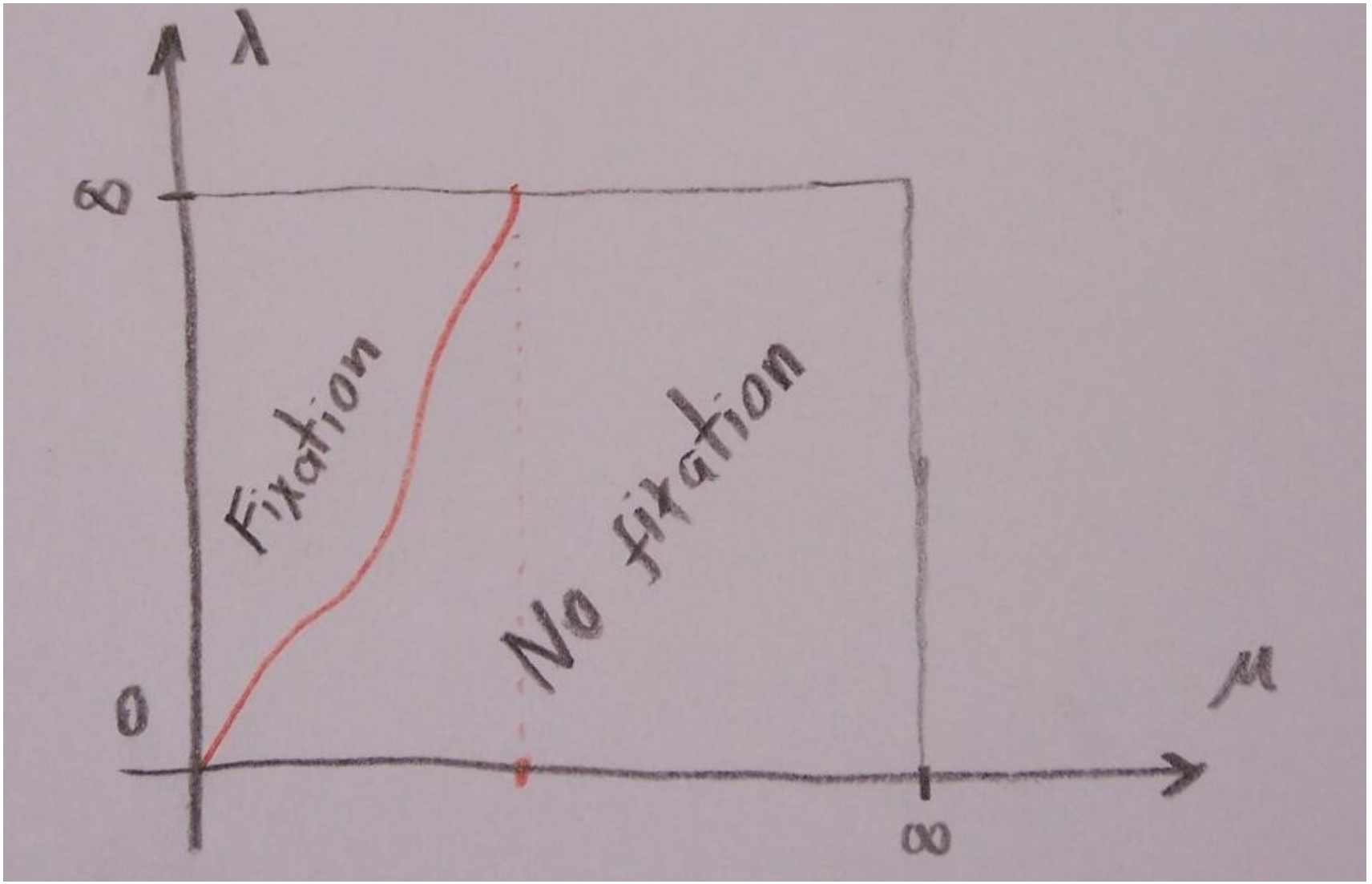
jump	rate $D_A=1$, $D_B=0$
$A \to B$	λ
$A+B \to 2A$	∞

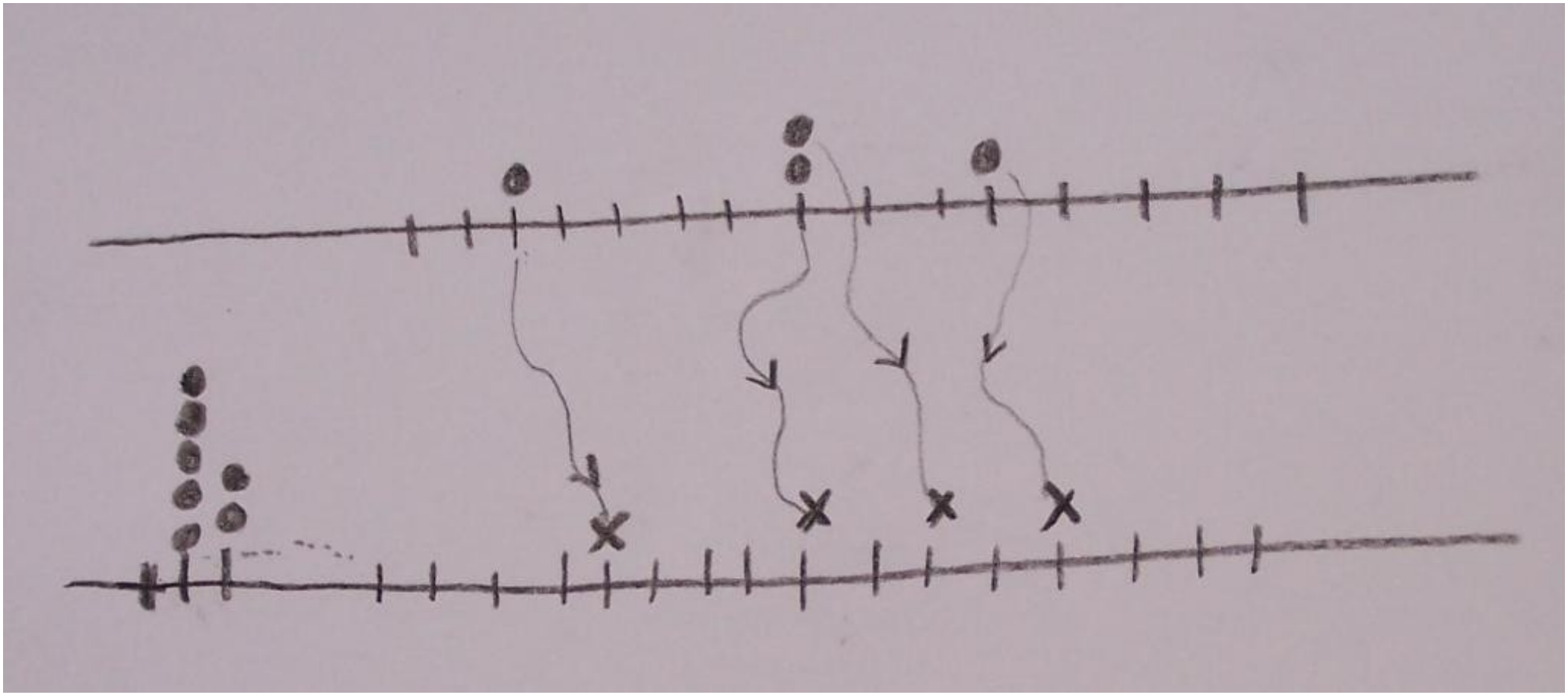
At $t = 0$, $\eta^B(x)=0$ $\eta^A(x)$ ~ i.i.d. Poisson(μ)

State: $\eta_t \in (\mathbb{Z}_+ \times \mathbb{Z}_+)^{\mathbb{Z}}$ Law: P^μ

Local Fixation: P^μ-a.s., for all Λ finite, there is t_0 such that for $t \geq t_0$, and x in Λ:

$$\eta^A_t(x) = 0$$


λ
∞
0
Fixation
No fixation
m
∞



$\exists\ \mu_c \in [0, \infty]$

(non decreasing in λ)

$\mu_c > 0$

$\mu_c < \infty$

$\mu_c \leq 1$

$\mu_c \to 1$ as $\lambda \to \infty$

$\mu_c < 1$

$\mu_c \to 0$ as $\lambda \to 0$

$\exists\ \lambda > 0,\ \mu < 1 \to$ NO FIXATION

$\exists\ \mu_c \in [0,\infty]$ ✓

(non decreasing in λ)

$\mu_c > 0$ ✓ d=1 (d≥2, work in progress)

$\mu_c < \infty$ easy

$\mu_c \leq 1$ ✓ d=1 (d≥2 Shellef)

$\mu_c \to 1$ as $\lambda \to \infty$ ✓

$\mu_c < 1$?

$\mu_c \to 0$ as $\lambda \to 0$?

$\exists\ \lambda > 0,\ \mu < 1 \to$ NO FIXATION ?

$\exists\ \mu_c$

($\mu_c > 1$

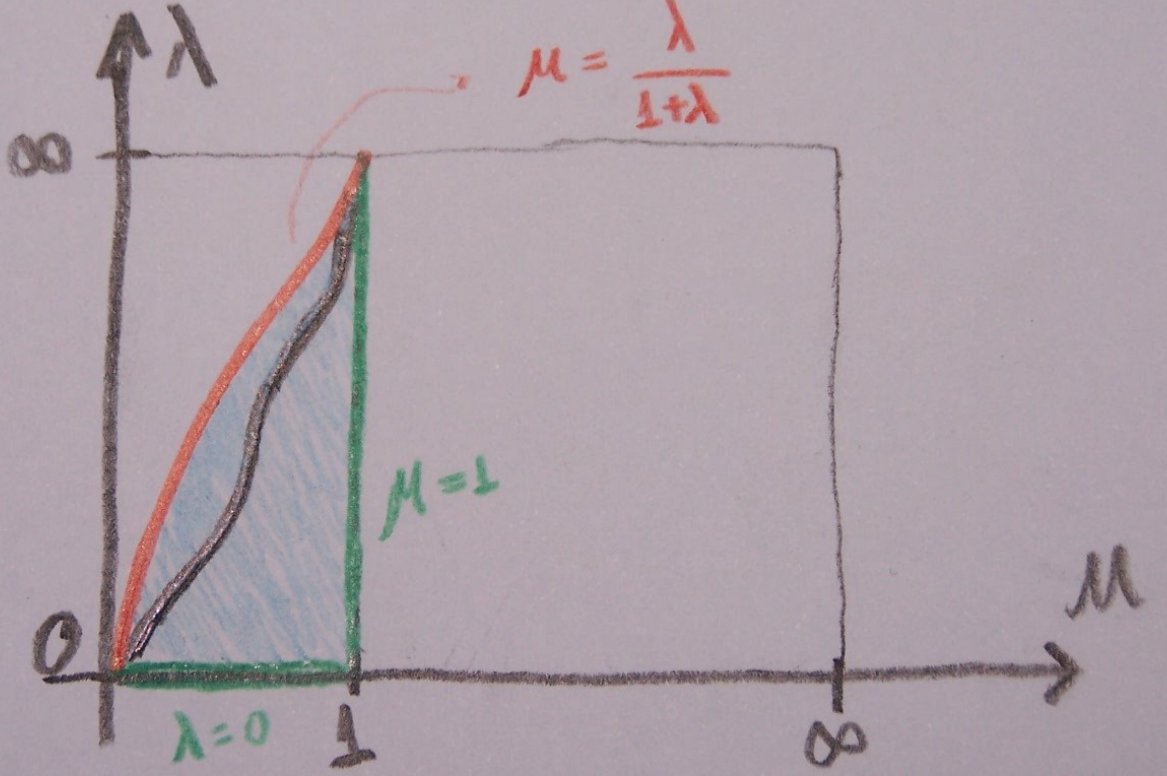
$\mu_c <$

μ_c

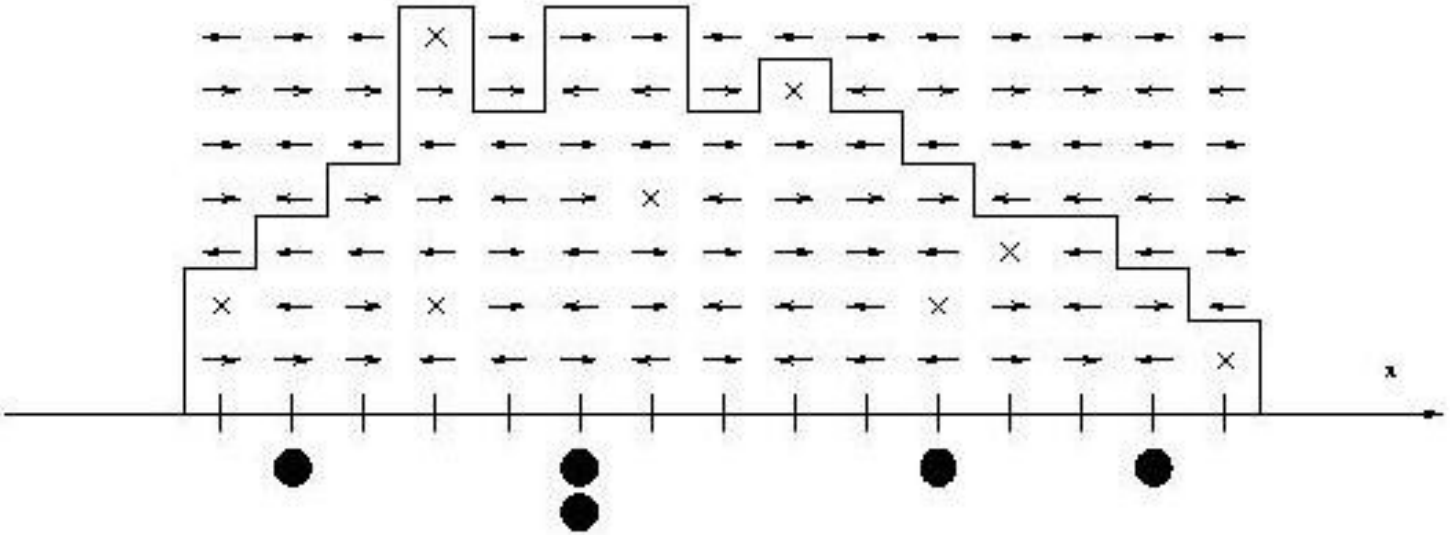
$\mu_c \to$

$\mu_c <$

$\mu_c \to$



$\exists\ \lambda > 0,\ \mu < 1 \rightarrow$ NO FIXATION ?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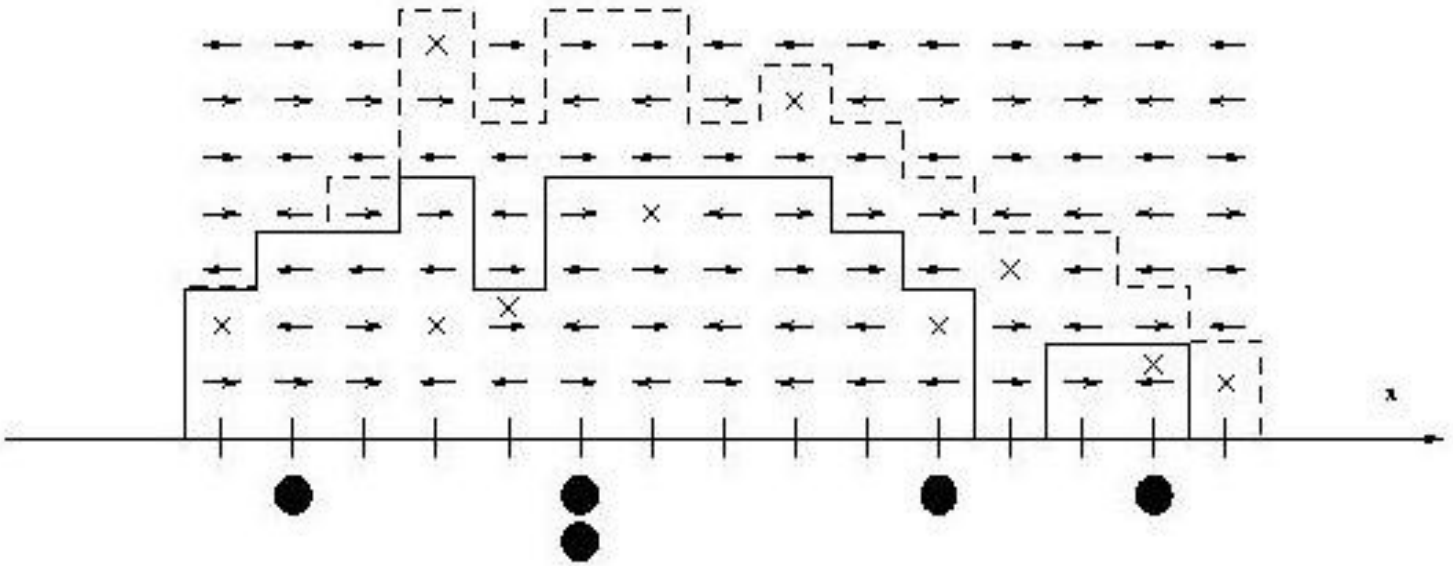
x

Thank you