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Lecture 5: Sampling from a chain

ACM 206, May 2, 2023

Swendsen-Wang sampler is fast

Near the critical temperature 000

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Metropolis sampler is slow

After $\mathcal{O}(10^6)$ iterations, Metropolis sampler still does not equilibrate.

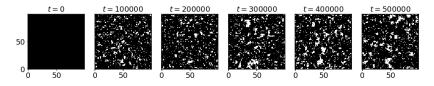


Figure: First 5×10^4 steps of Metropolis sampler

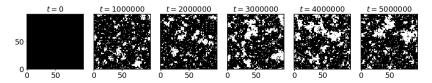


Figure: First 5×10^6 steps of Metropolis sampler

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Metropolis sampler is slow

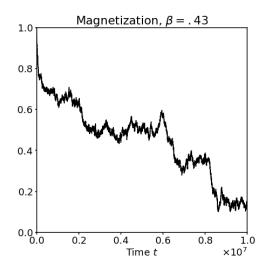


Figure: Time series of average magnetization

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Swendsen-Wang sampler is fast

Near the critical temperature 000

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Swendsen-Wang sampler is fast

After $\mathcal{O}(10)$ iterations, Swendsen-Wang algorithm equilibrates.

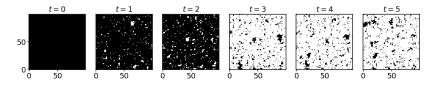


Figure: First 5 steps of Swendsen-Wang

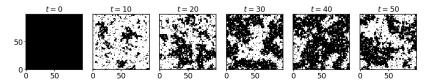


Figure: First 50 steps of Swendsen-Wang

Swendsen-Wang sampler is fast

Near the critical temperature 000

Swendsen-Wang sampler is fast

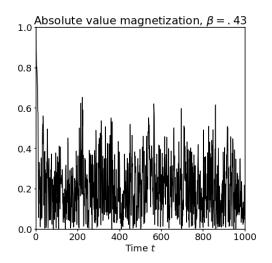


Figure: Time series of absolute value average magnetization

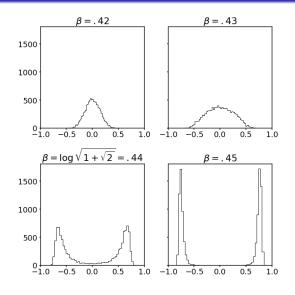
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Swendsen-Wang sampler is fast

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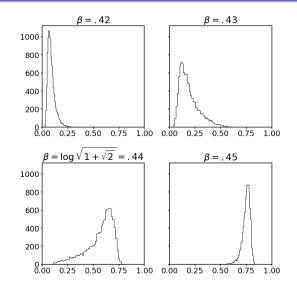
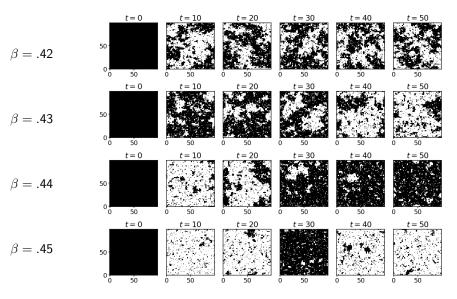


Figure: A large fraction of lattice area is occupied by a single connected cluster. $\langle \Box \rangle \langle \Box$ Swendsen-Wang sampler is fast

Near the critical temperature

Near the critical temperature



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