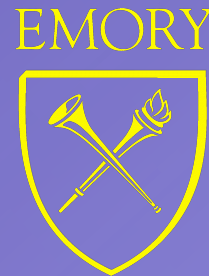


Local field distributions in spin glasses

Stefan
Boettcher

www.physics.emory.edu/faculty/boettcher/

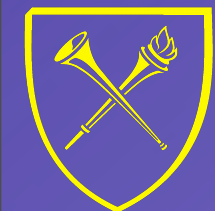


Collaborators:

- ▶ David Sherrington (Oxford U)
- ▶ Helmut Katzgraber (ETH Zürich)

Find in: [arXiv:0711.3934](https://arxiv.org/abs/0711.3934) or JPA (soon)





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- ▶ **Low-d** vs **Mean-Field**,
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⇒ Conclusions:

- ▶ **All $P(h)$ are amazingly similar,**
- ▶ **But: Characteristic variation near $P(h=0)$!**





Models:





Models:

- ▶ **Edwards-Anderson (EA)** for $d=2,3,4$;





Models:

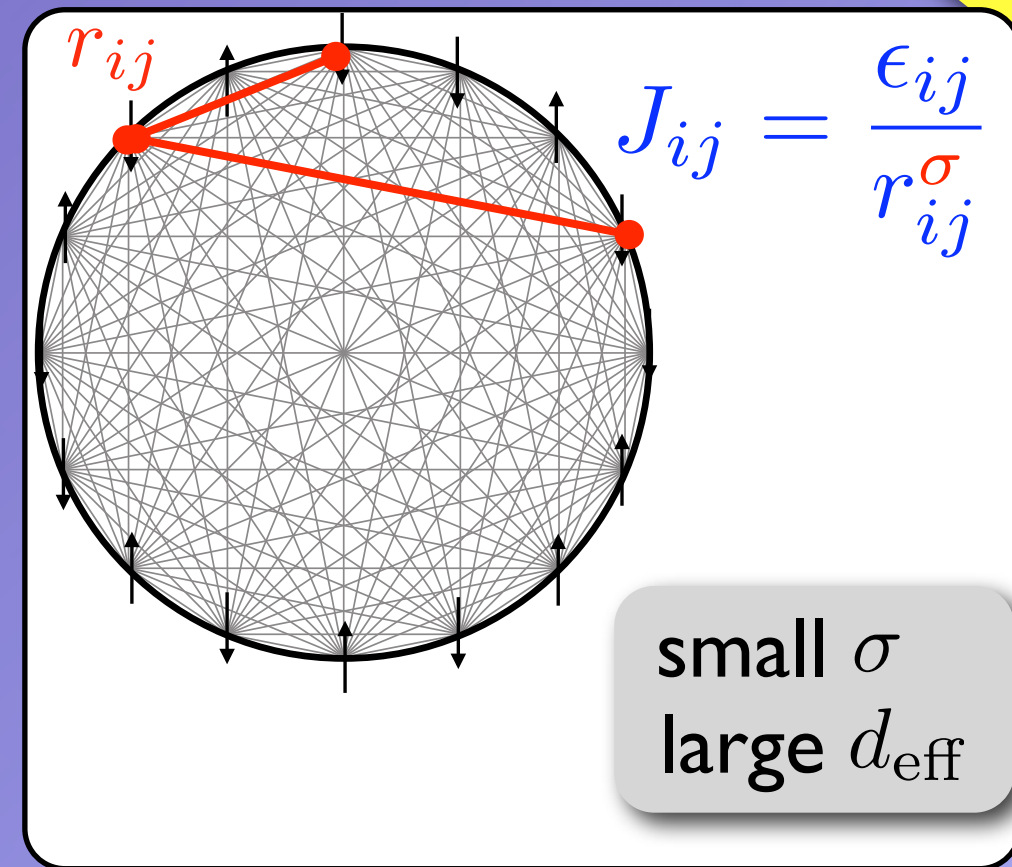
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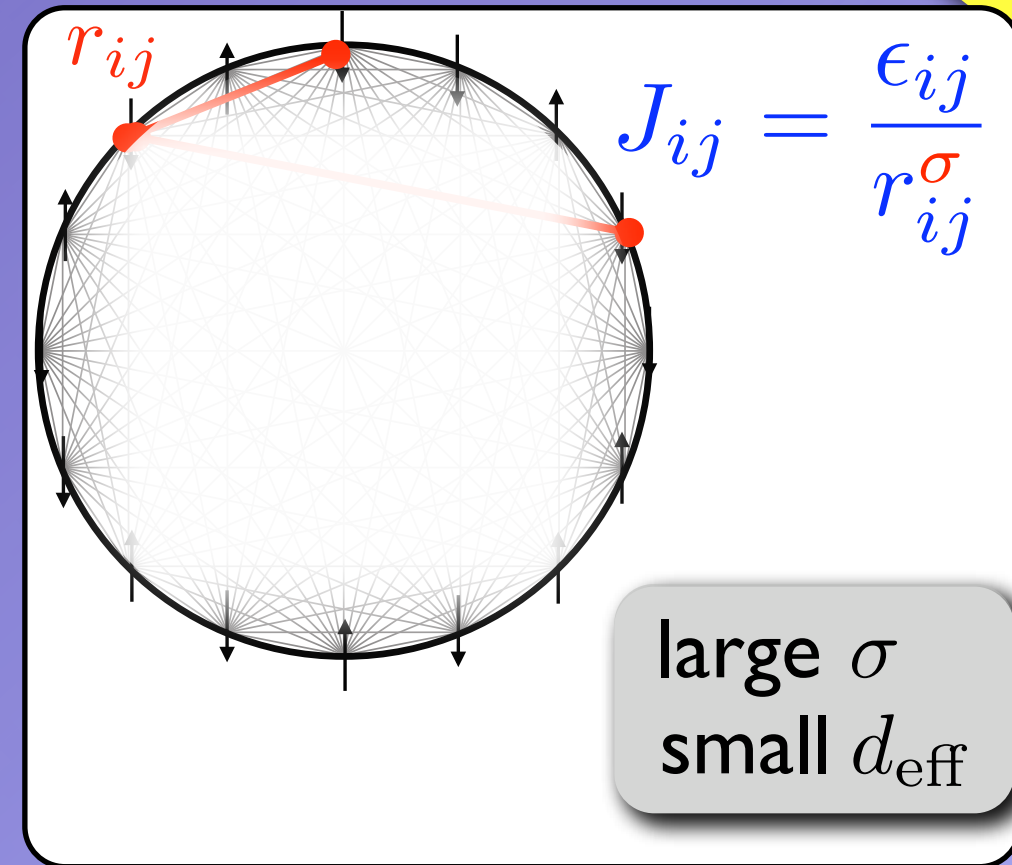
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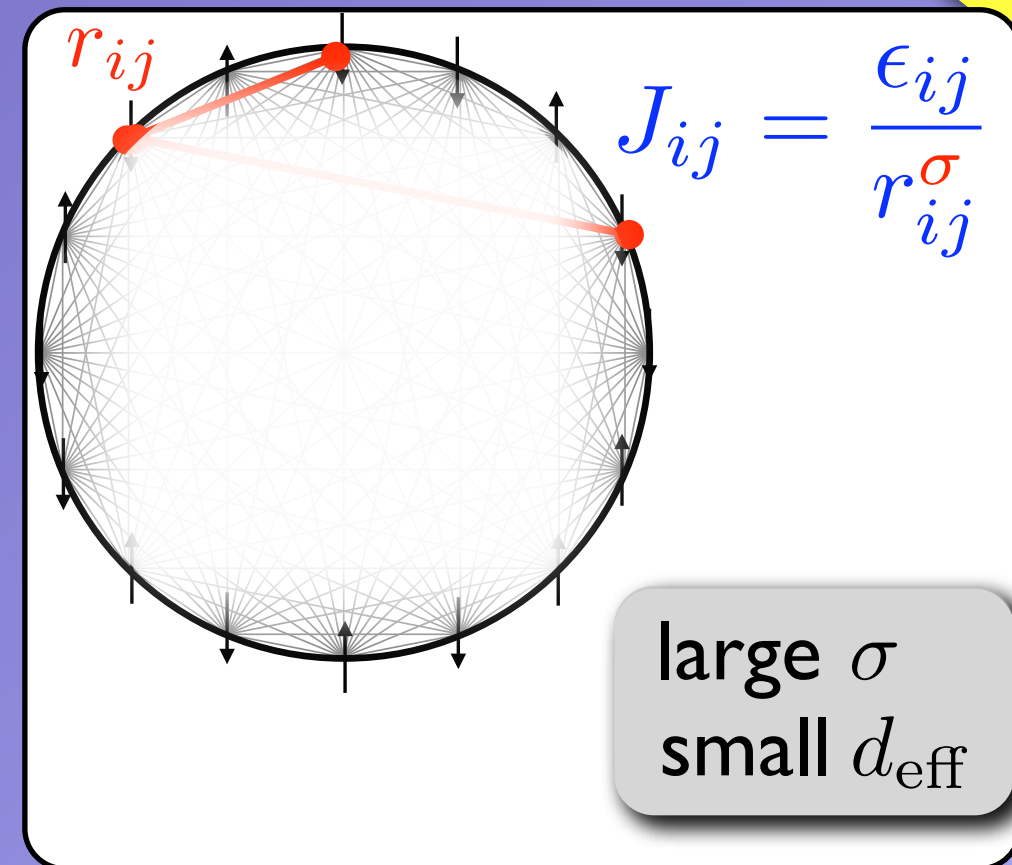
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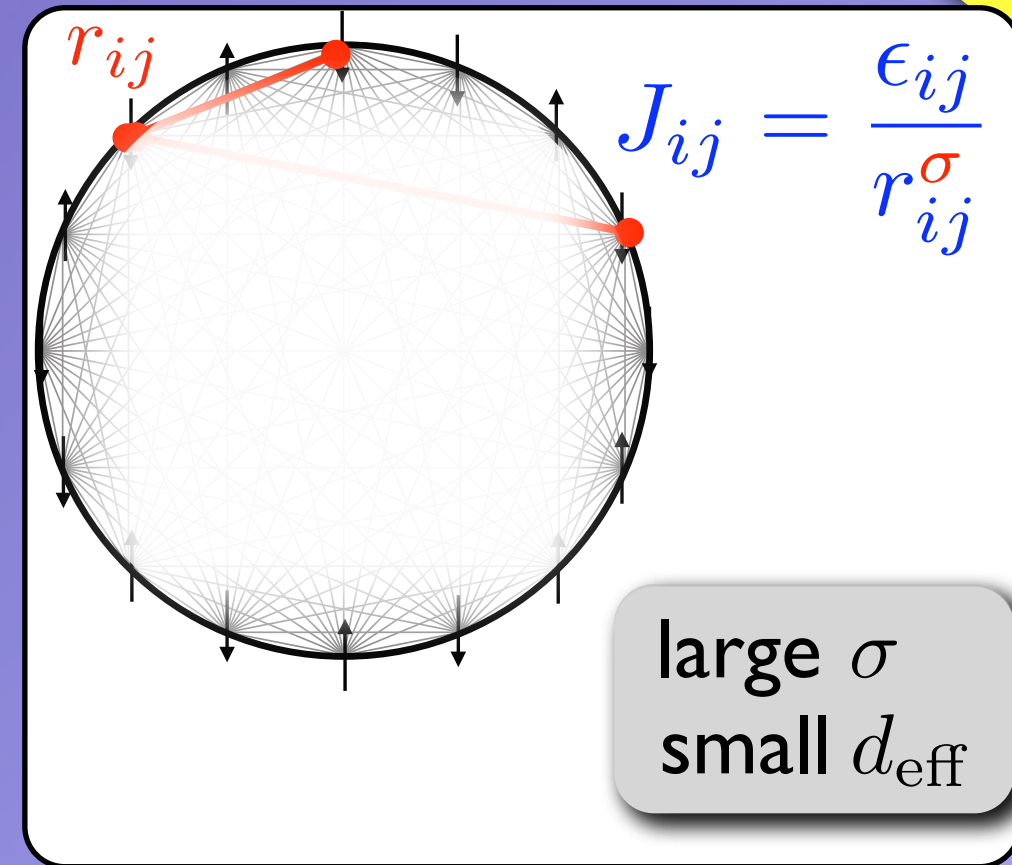


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Methods:

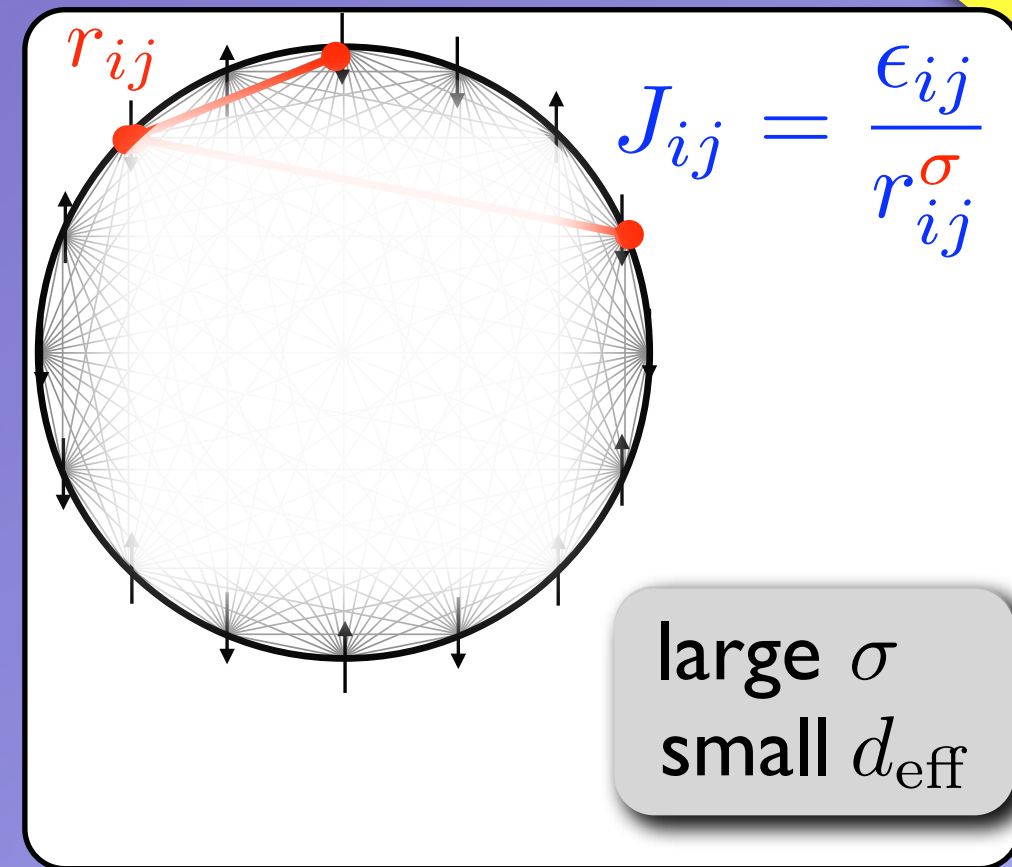
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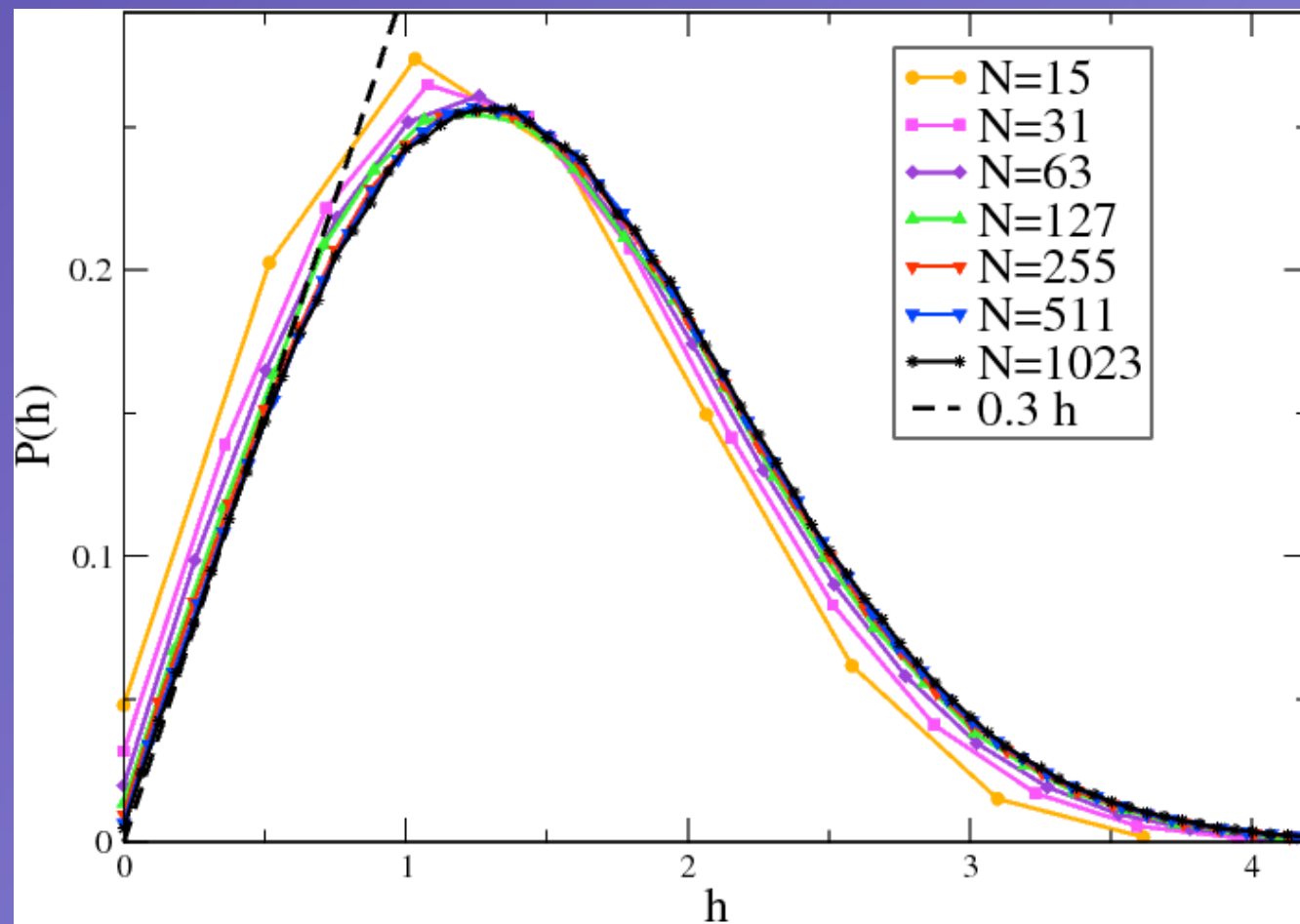
Methods:

- ▶ **Extremal Optimization Heuristic** ($T=0$) for **SK** and **EA**;
- ▶ **Parallel Tempering** ($T=0.05 \dots 1.4$) for **Long-Range Model**;



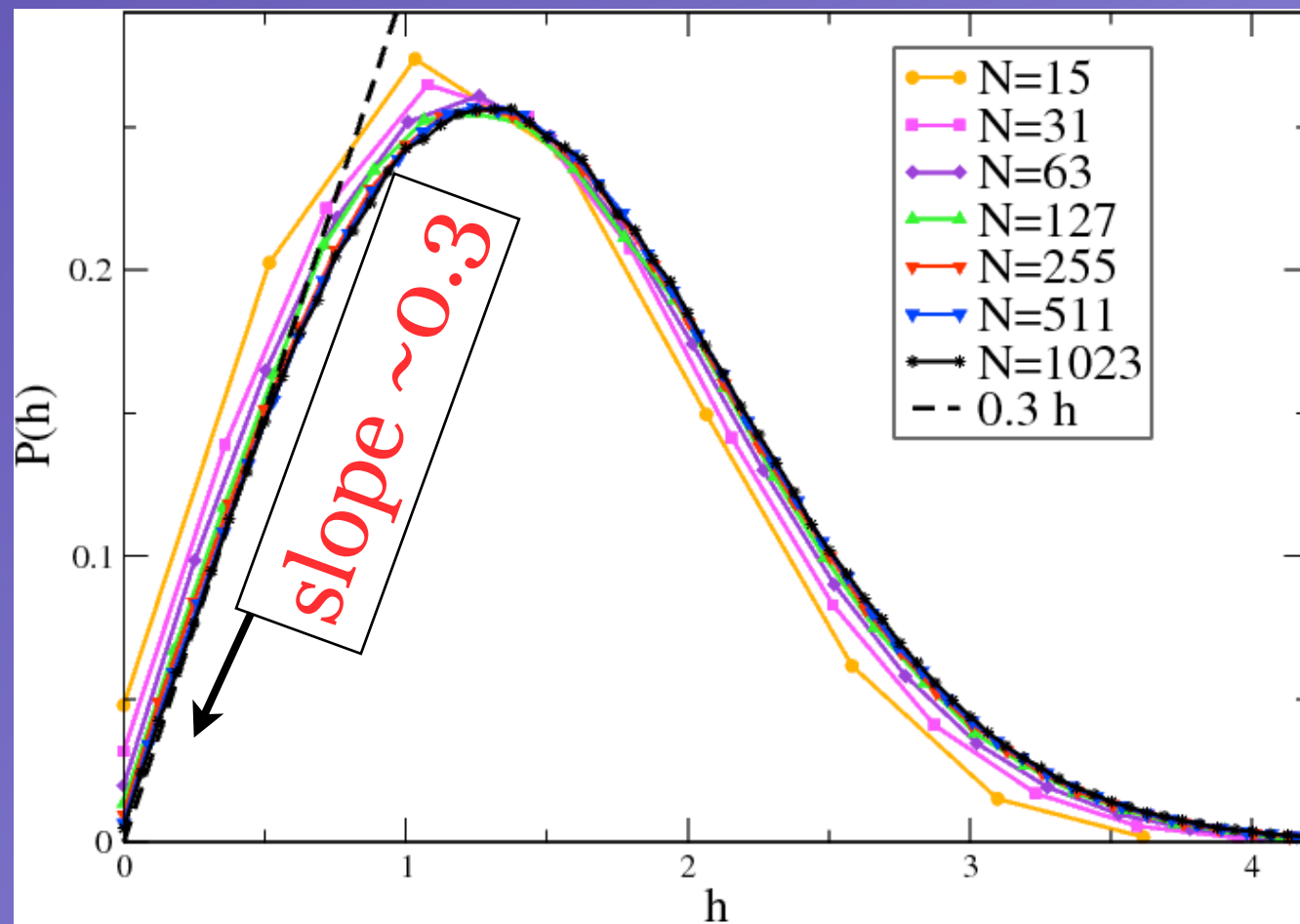


Sherrington-Kirkpatrick:



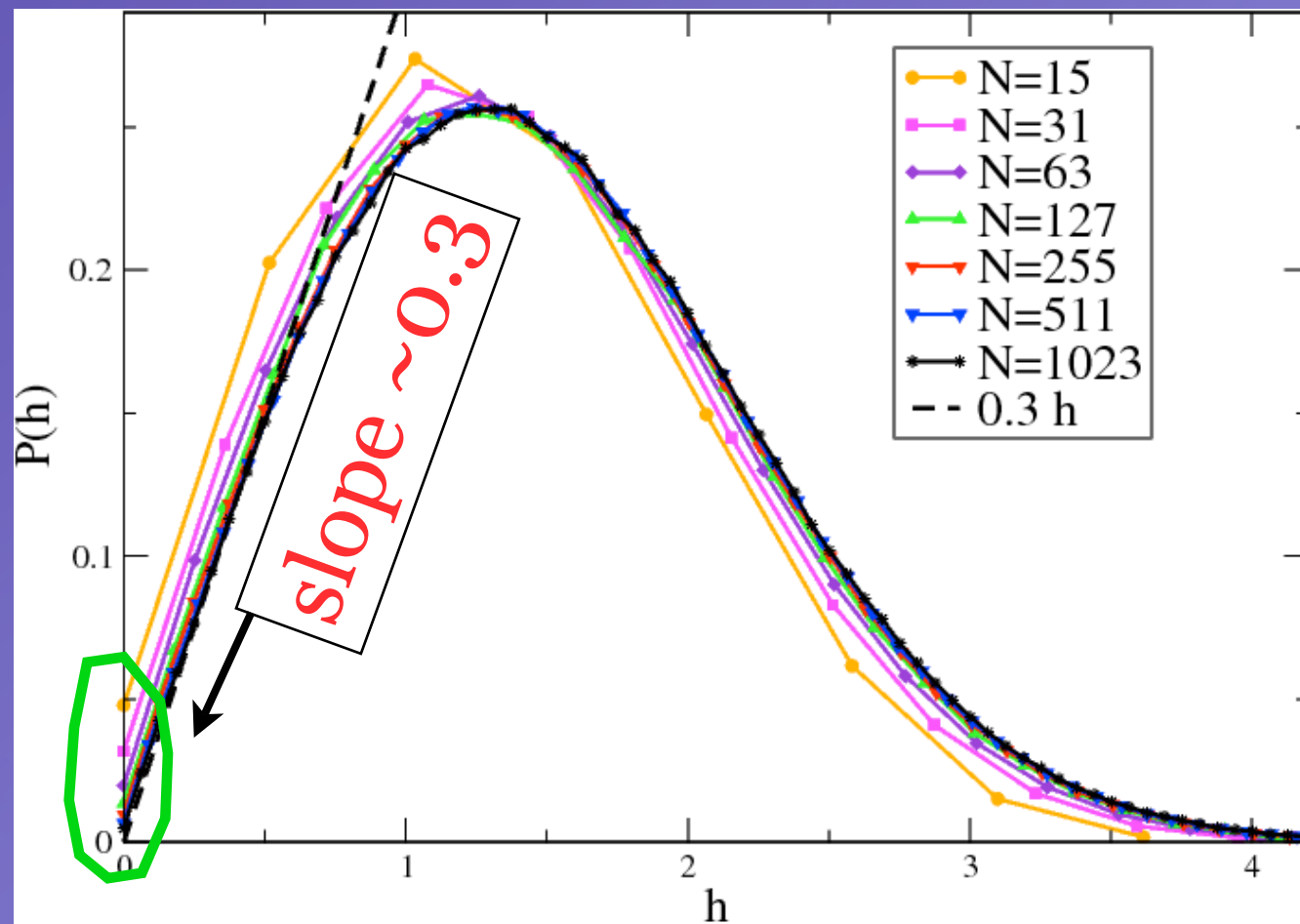


Sherrington-Kirkpatrick:



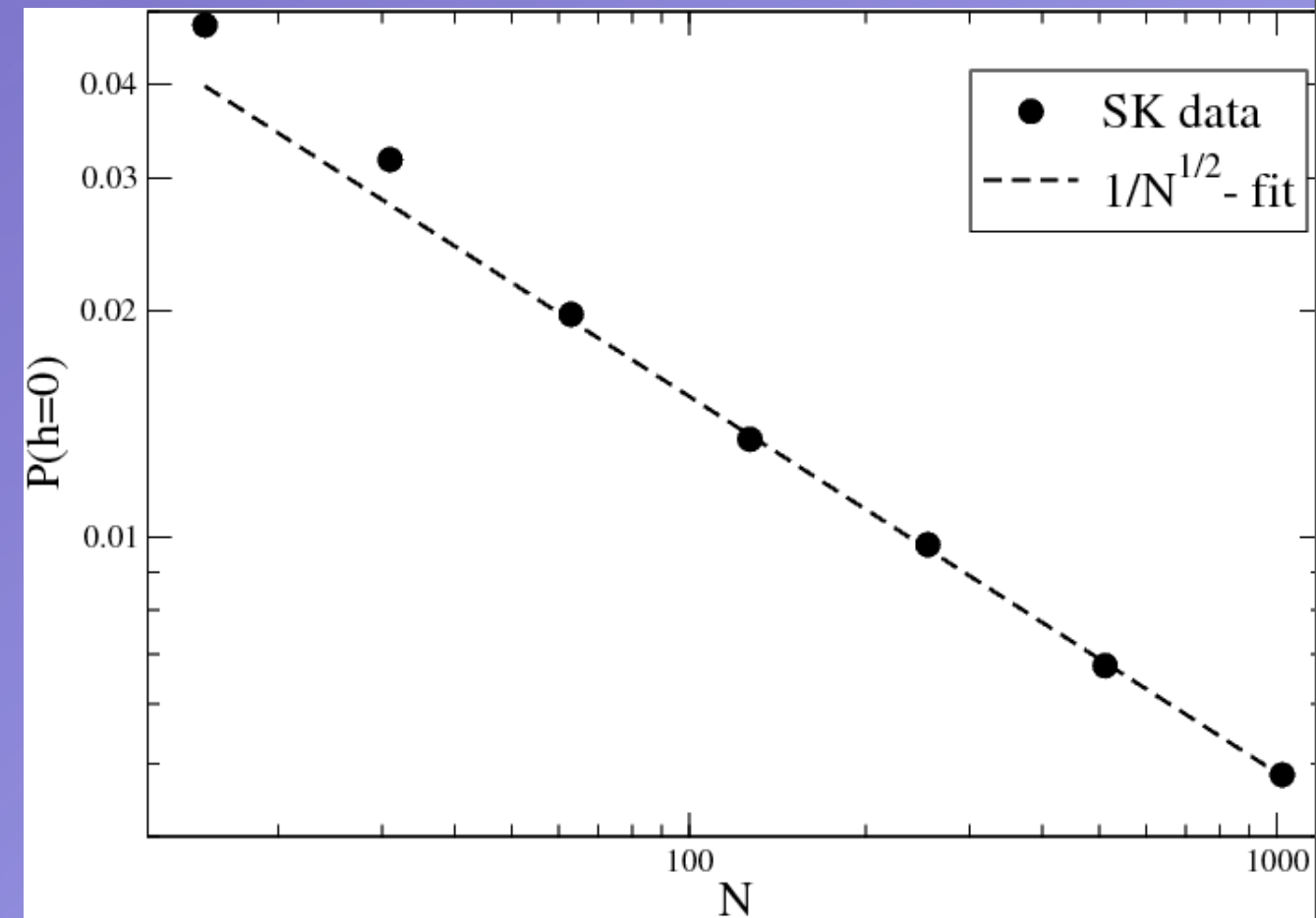
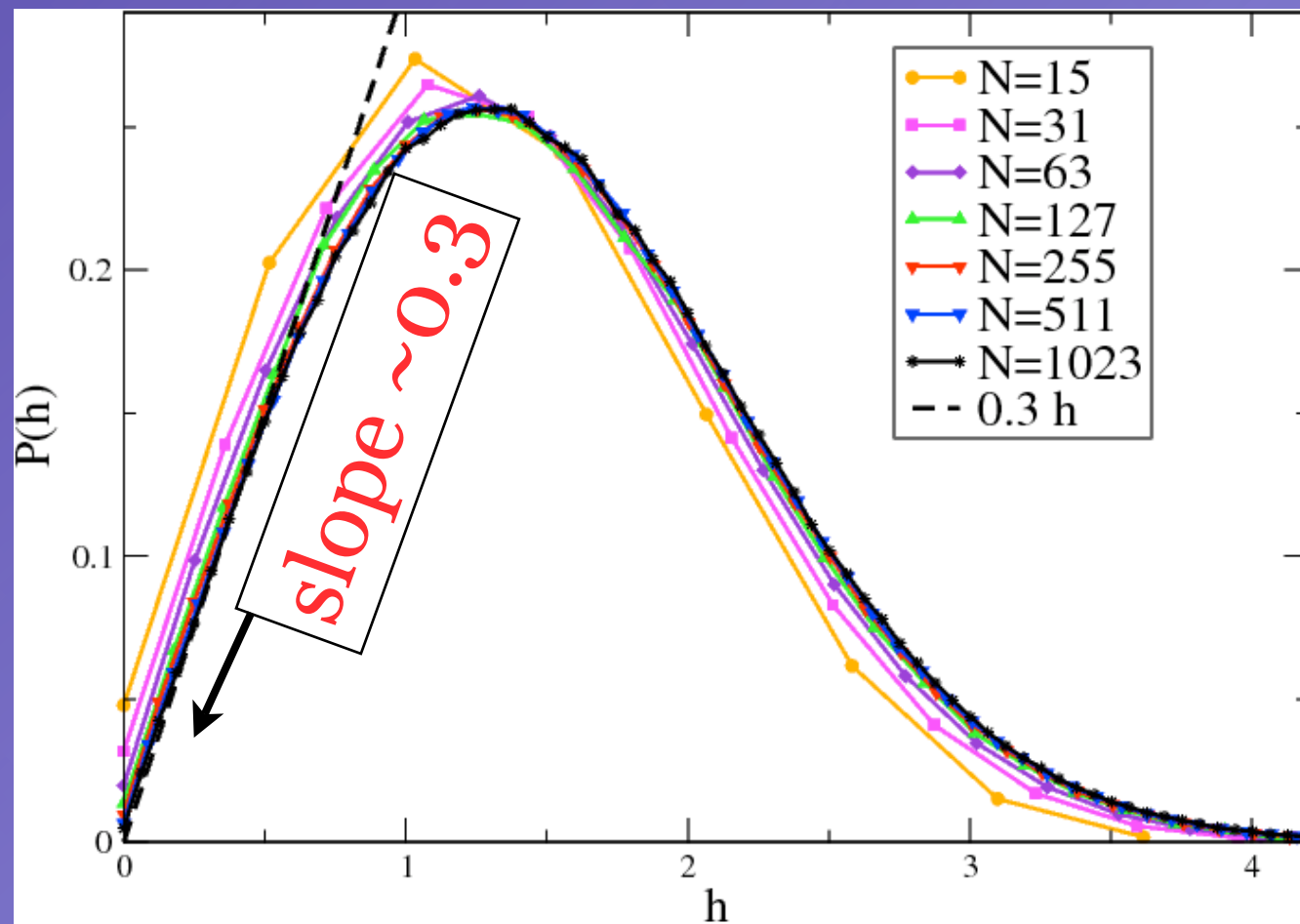


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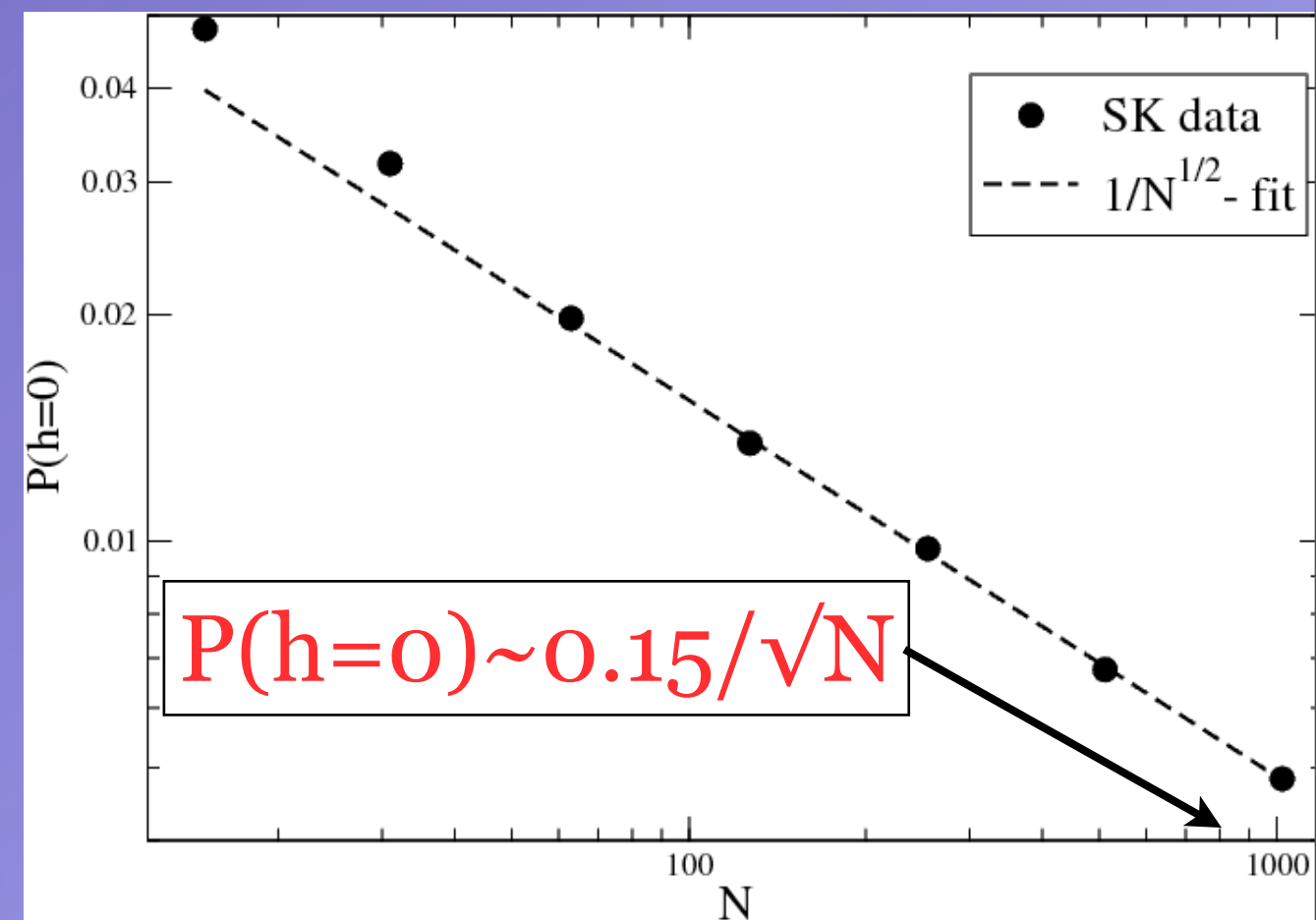
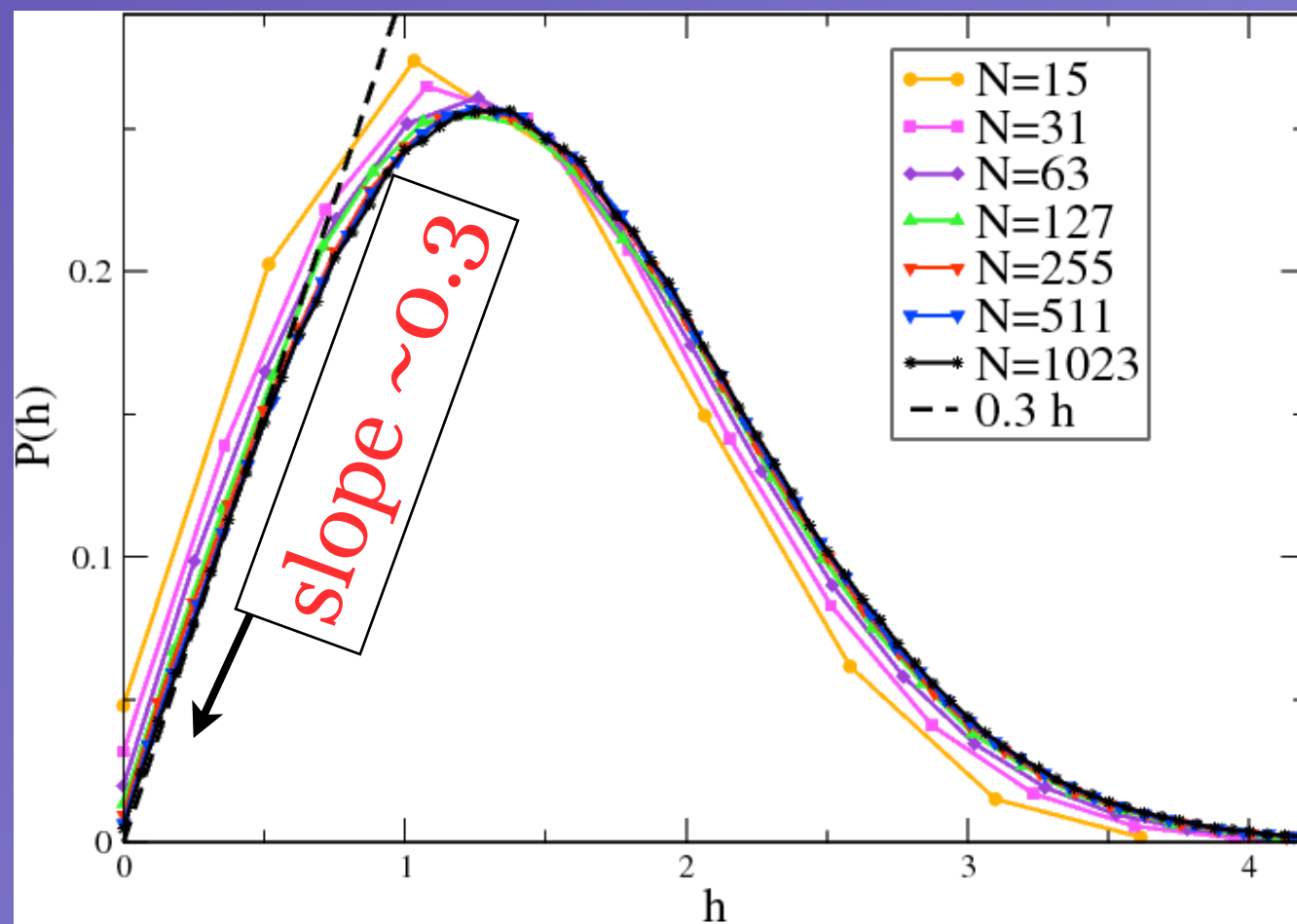


Sherrington-Kirkpatrick:





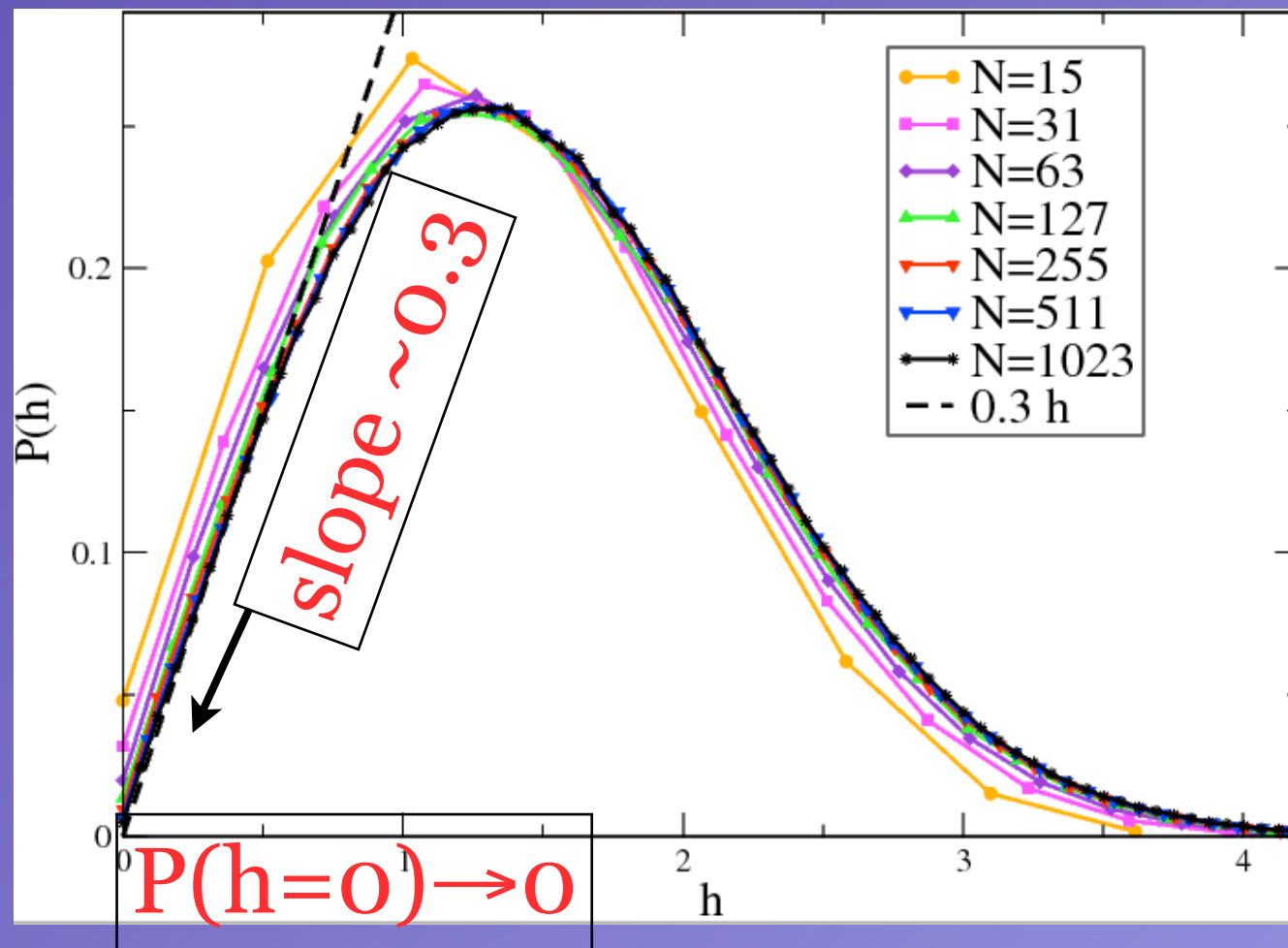
Sherrington-Kirkpatrick:





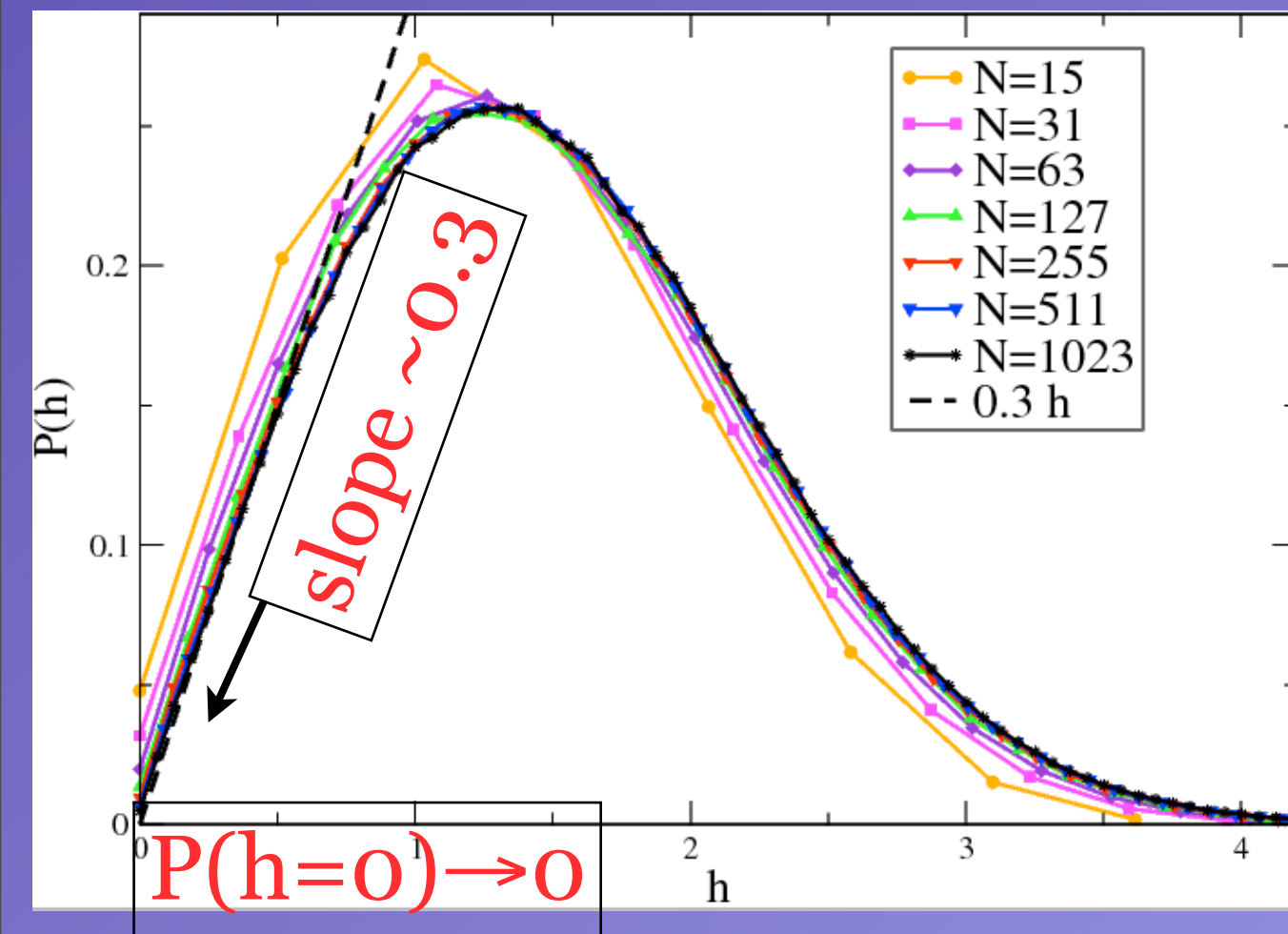
Edwards-Anderson:

Sherrington-Kirkpatrick:

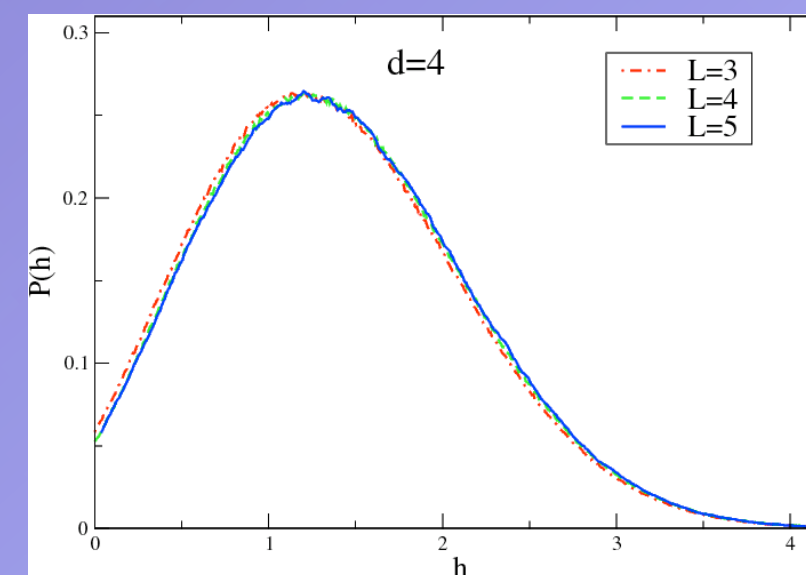
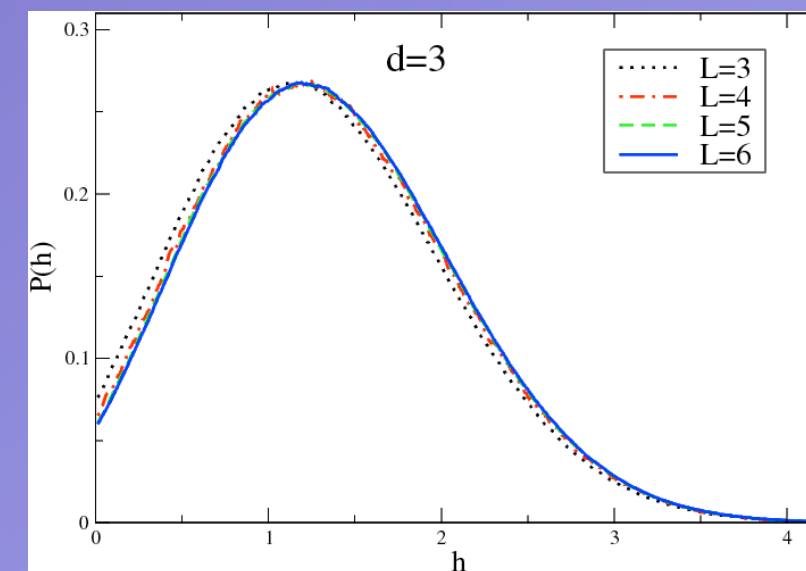
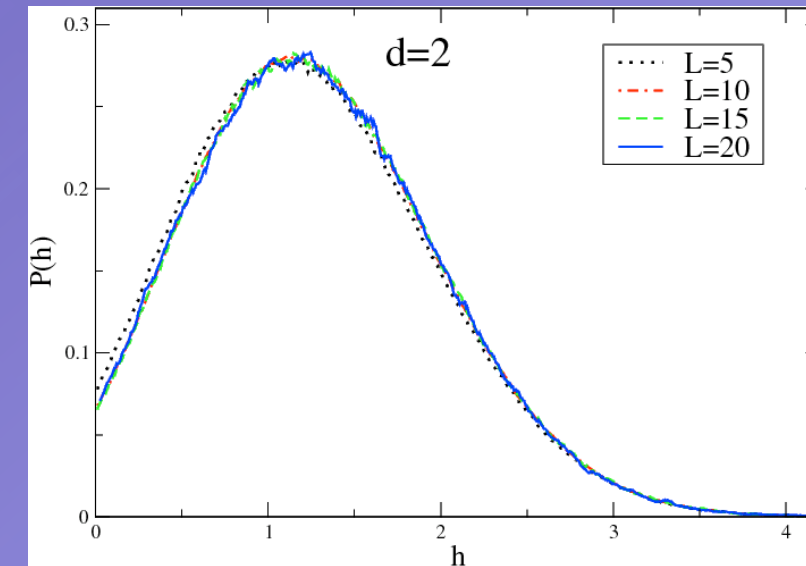




Sherrington-Kirkpatrick:

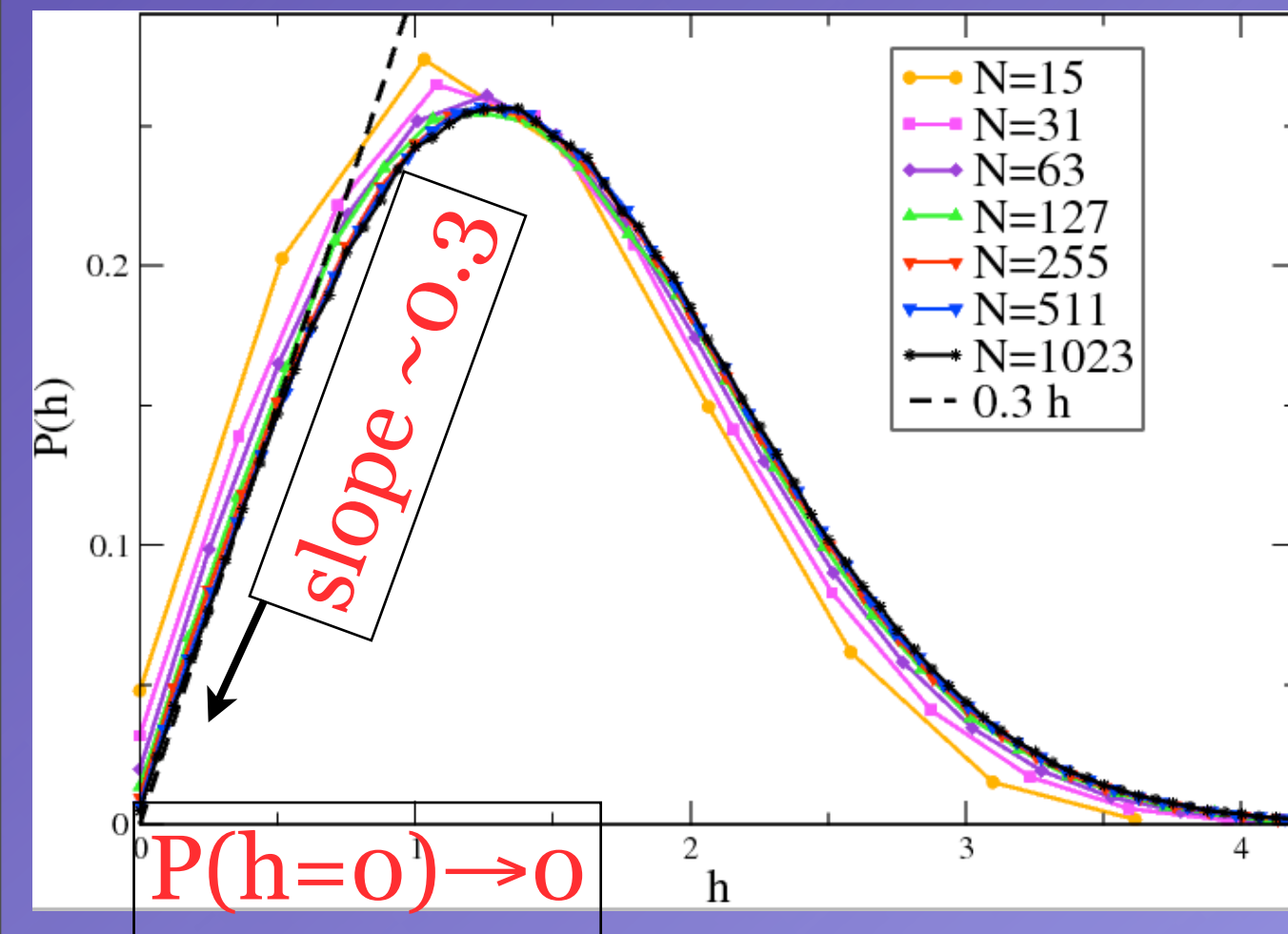


Edwards-Anderson:





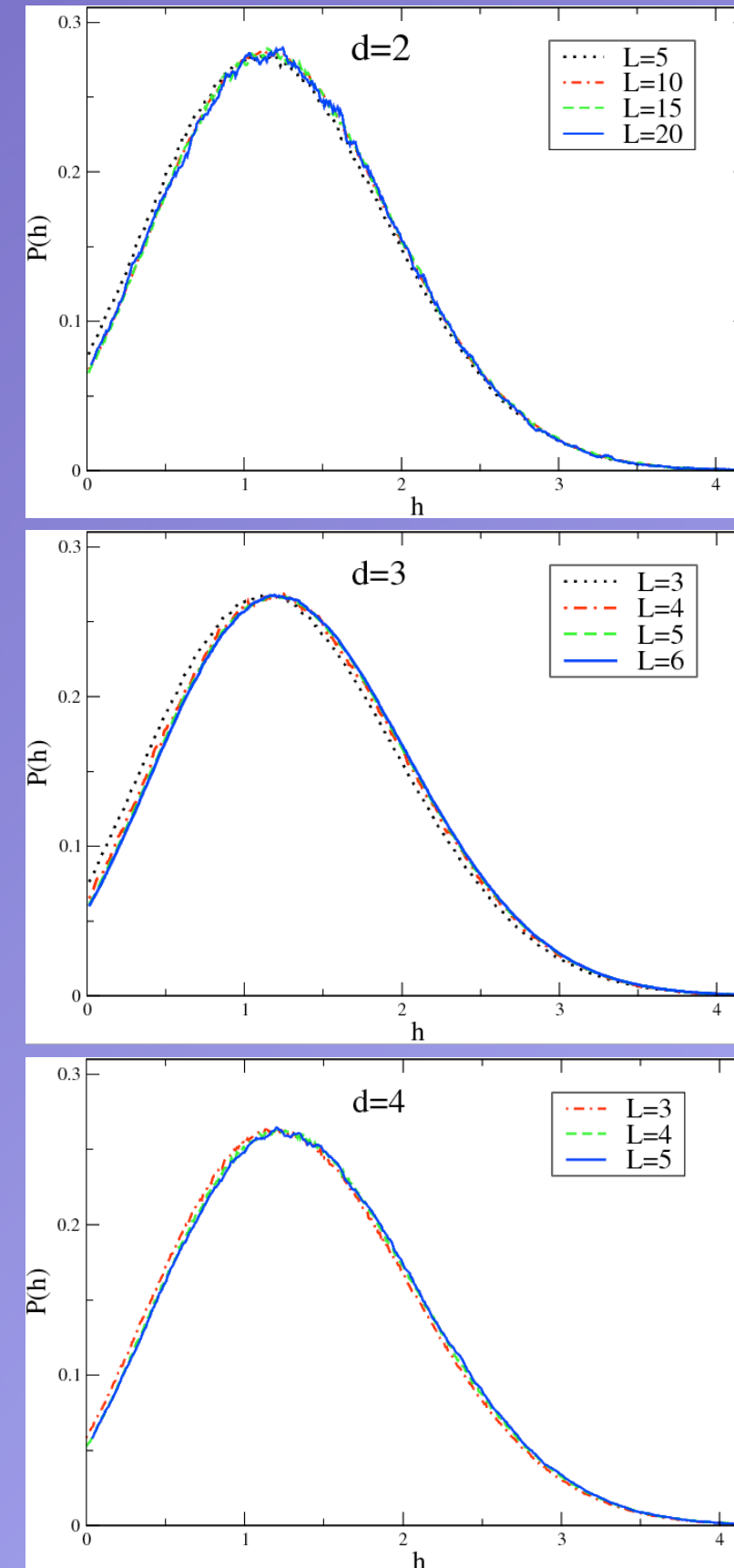
Sherrington-Kirkpatrick:



$\Rightarrow$ **in EA:**

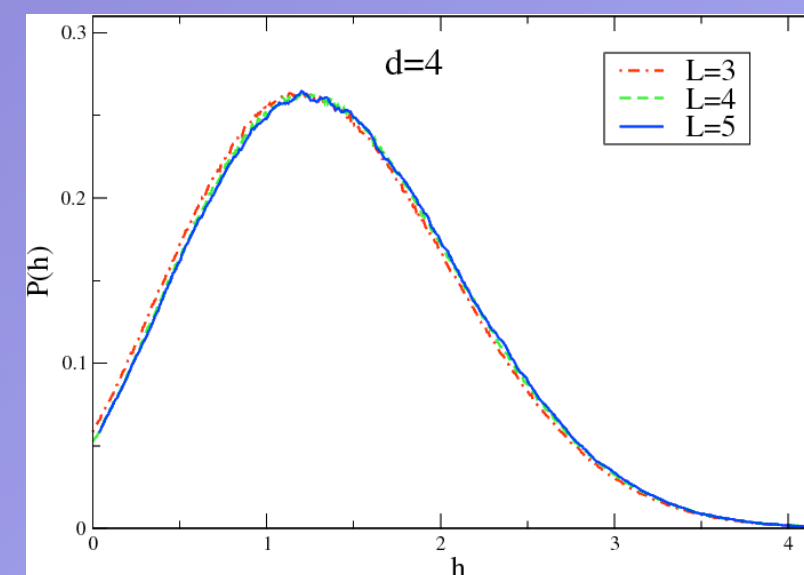
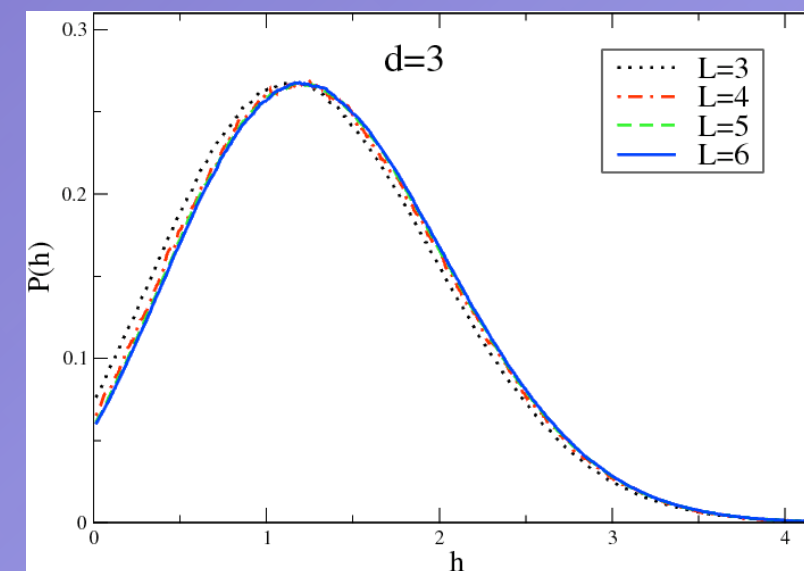
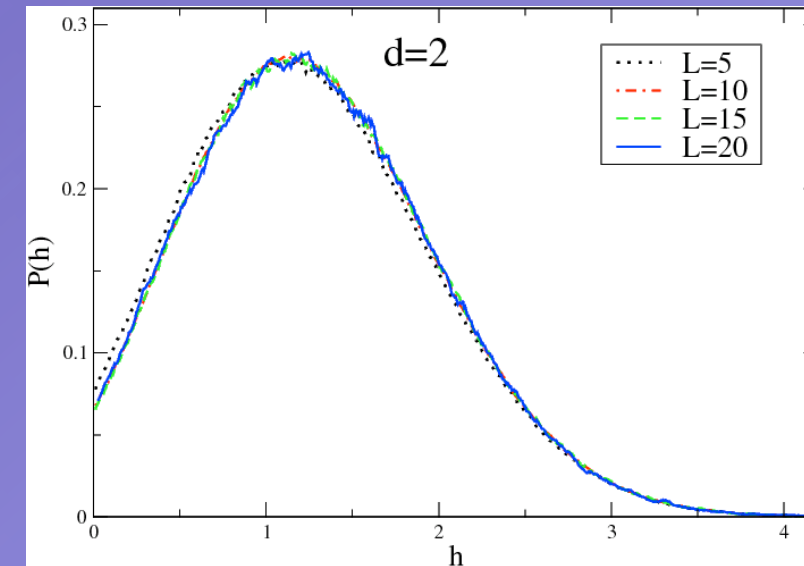
- ▶ Slope $\sim 0.23..0.25$
- ▶ $P(0) > 0$, but small!

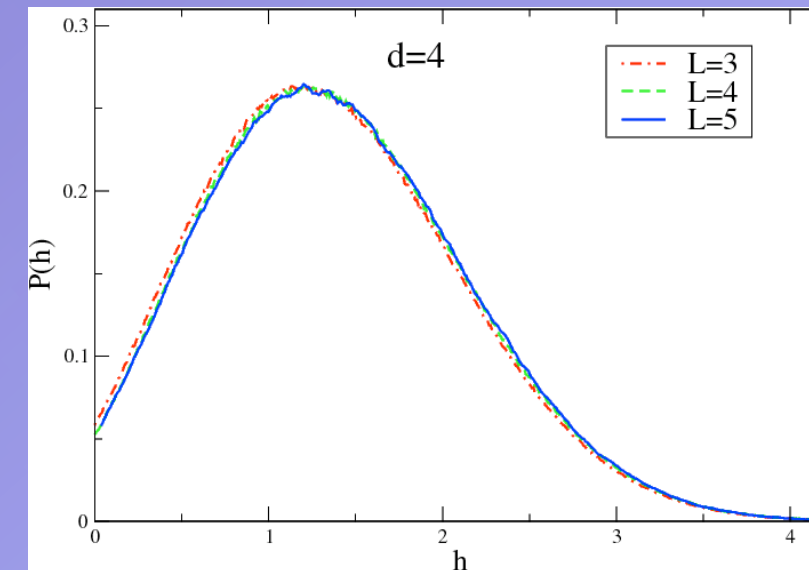
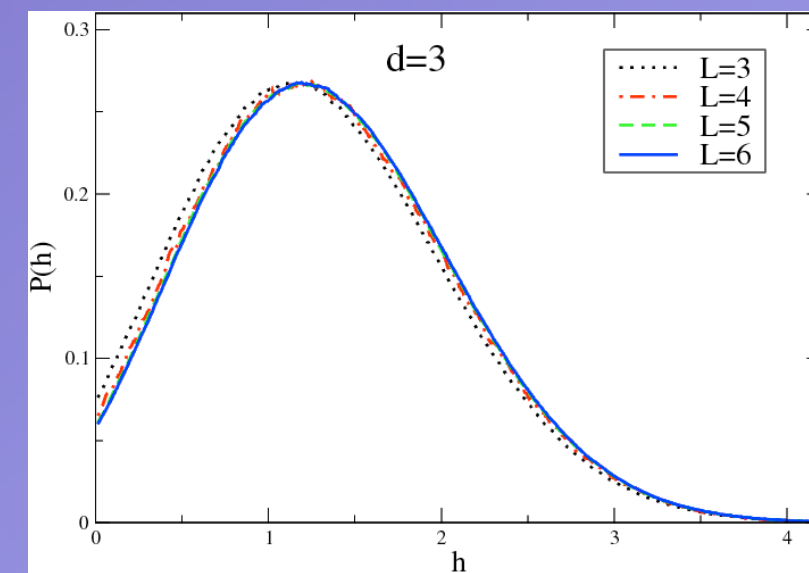
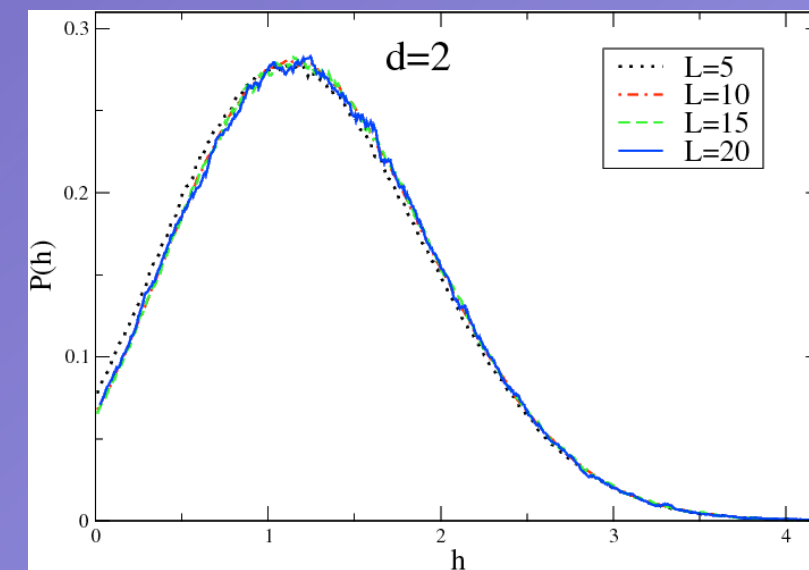
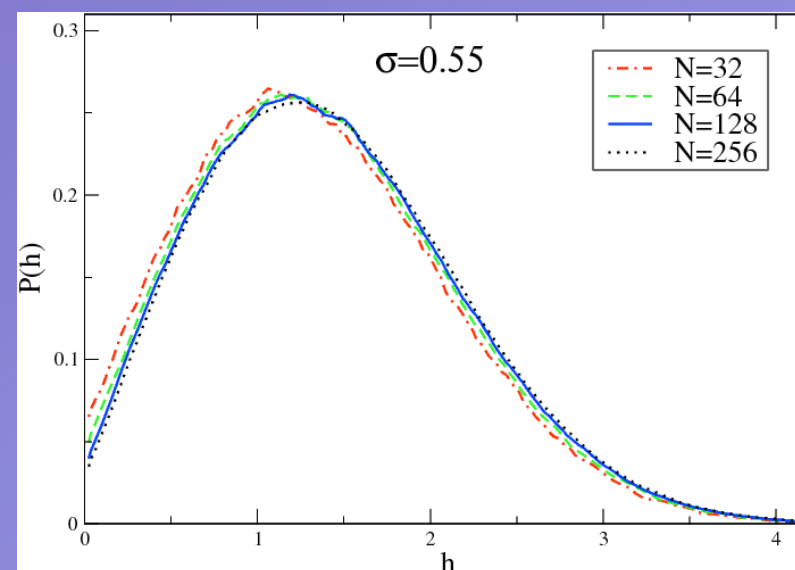
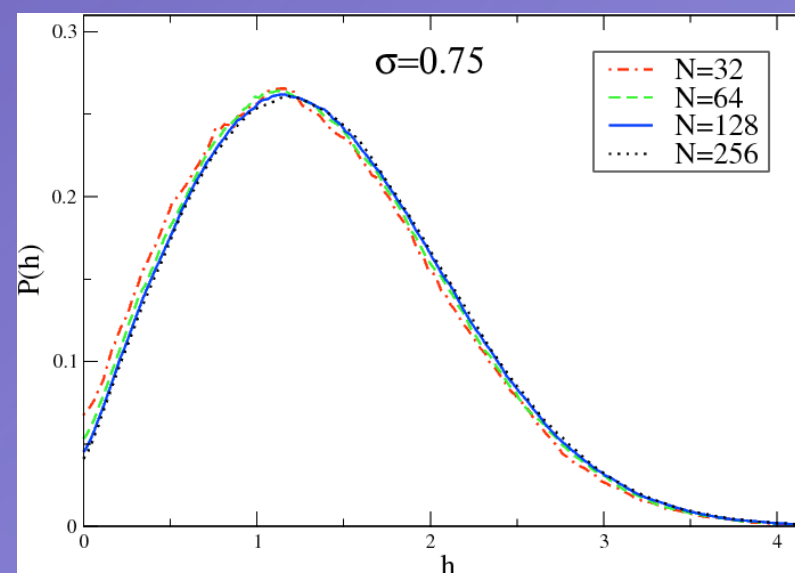
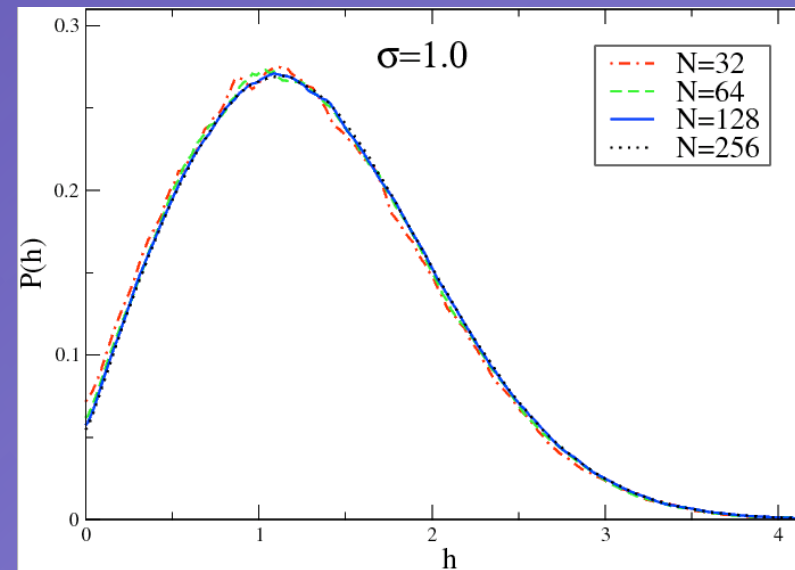
Edwards-Anderson:



1d Long-Range:

Edwards-Anderson:



1d Long-Range:Edwards-Anderson:

1d Long-Range:Edwards-Anderson:⇒ in SK:

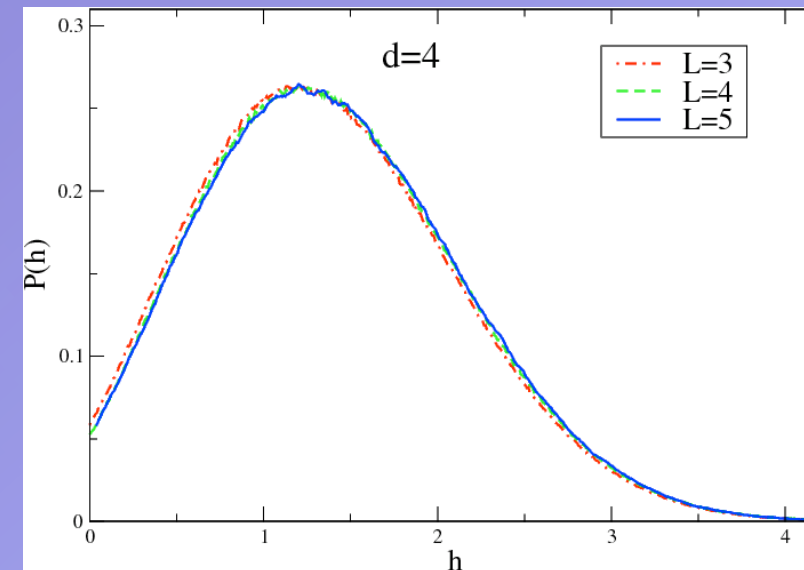
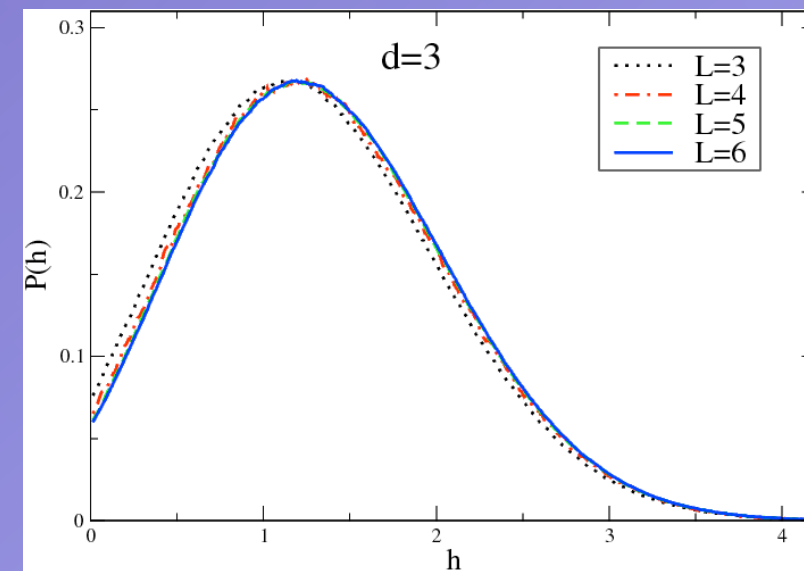
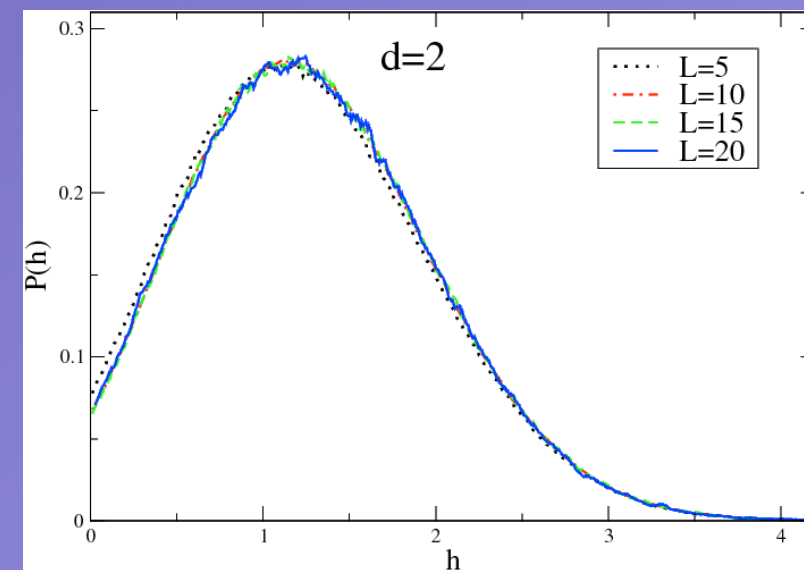
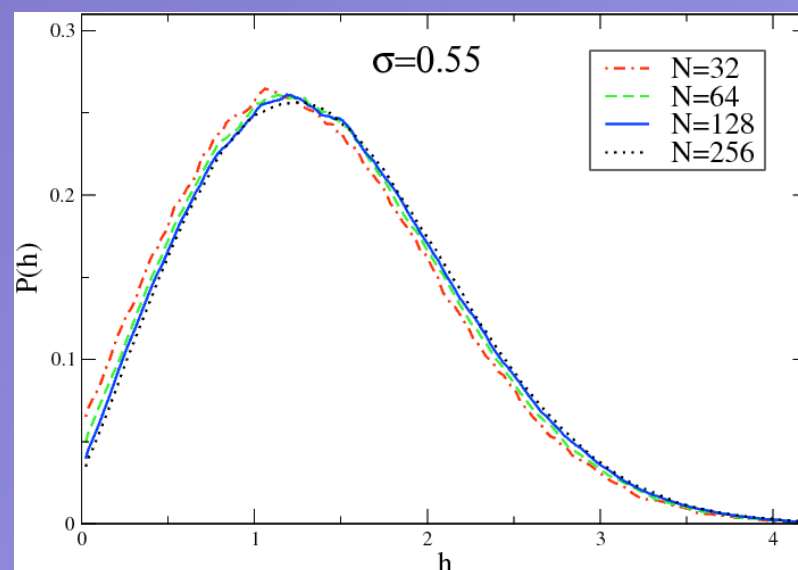
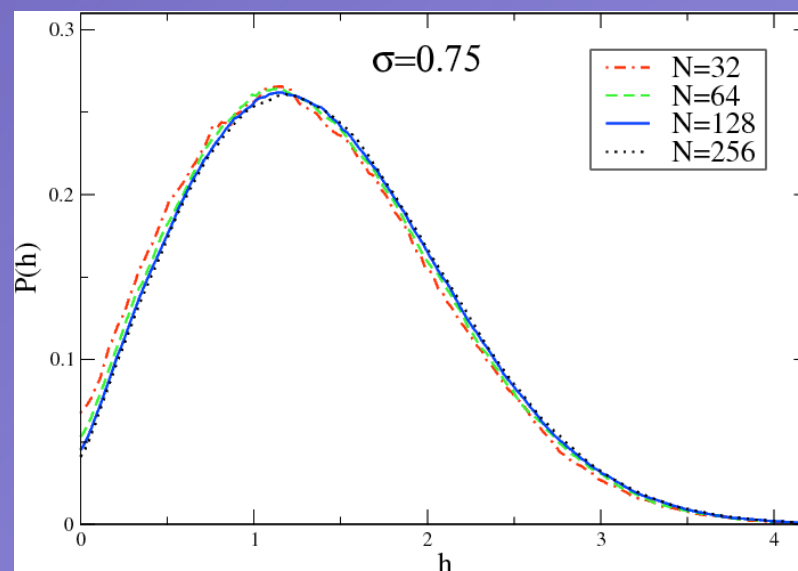
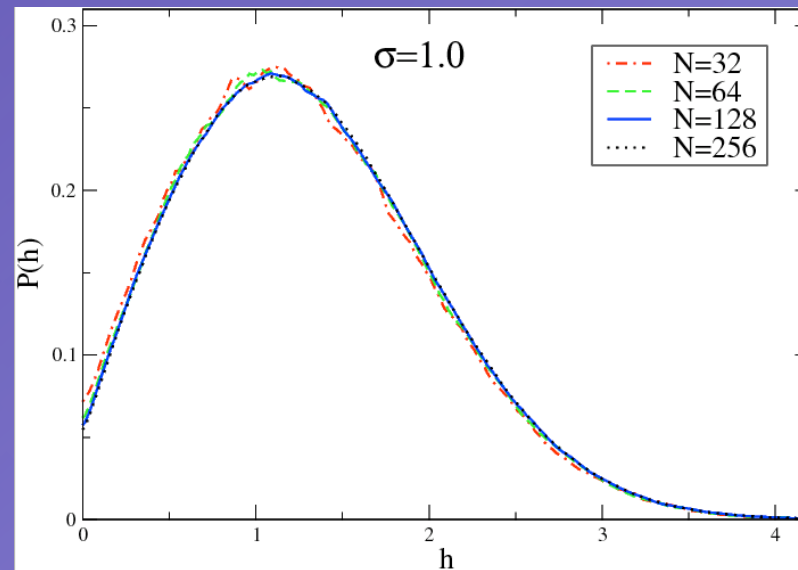
- ▶ Slope ~ 0.3 ,
- ▶ $P(0) \rightarrow 0$,

⇒ in EA:

- ▶ Slope ~ 0.23 ,
- ▶ $P(0) > 0$,

⇒ in 1d LR:

- ▶ Slope ~ 0.3 ,
- ▶ $P(0) > 0$,





1d Long-Range:

Edwards-Anderson:

03-10-08



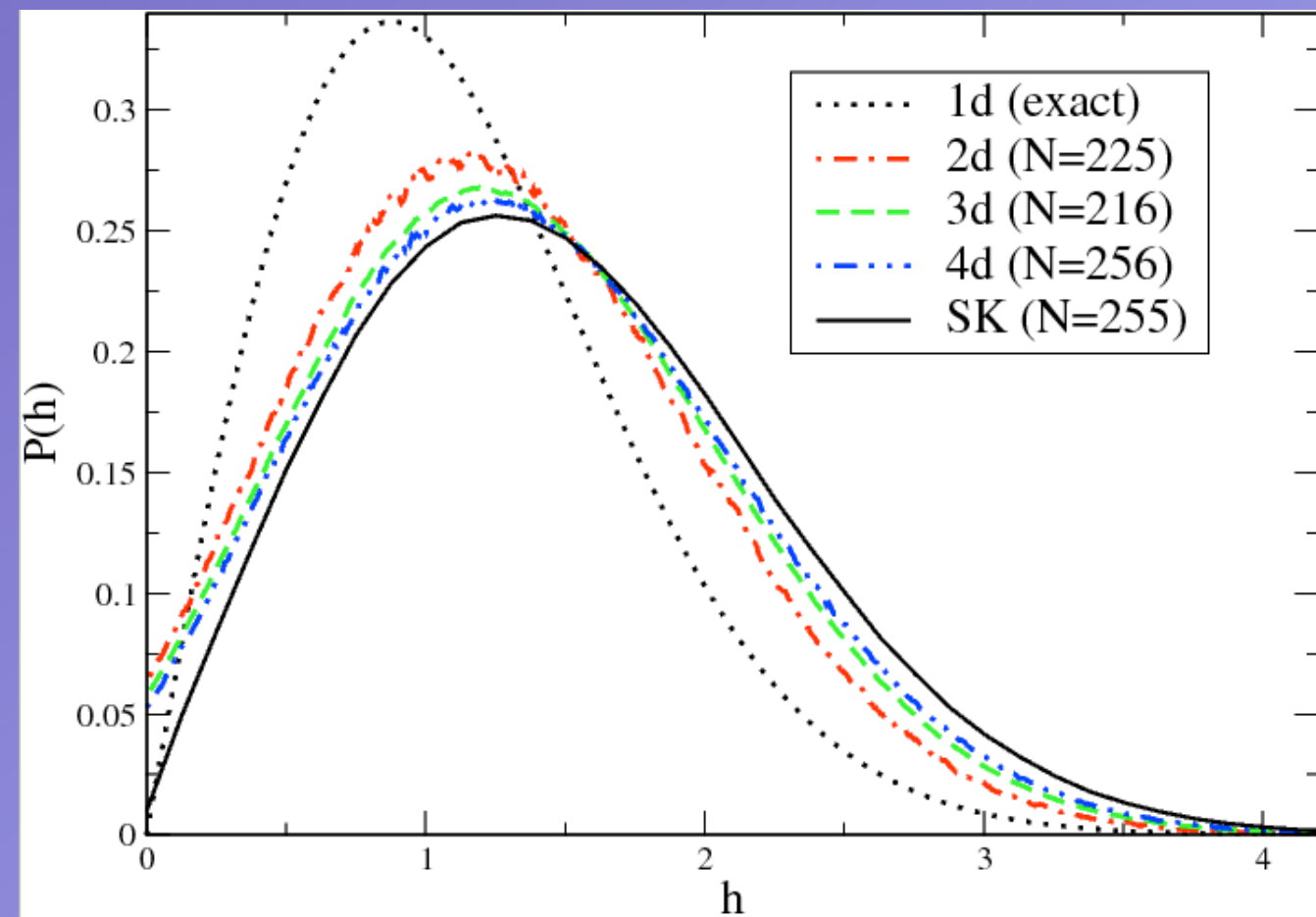
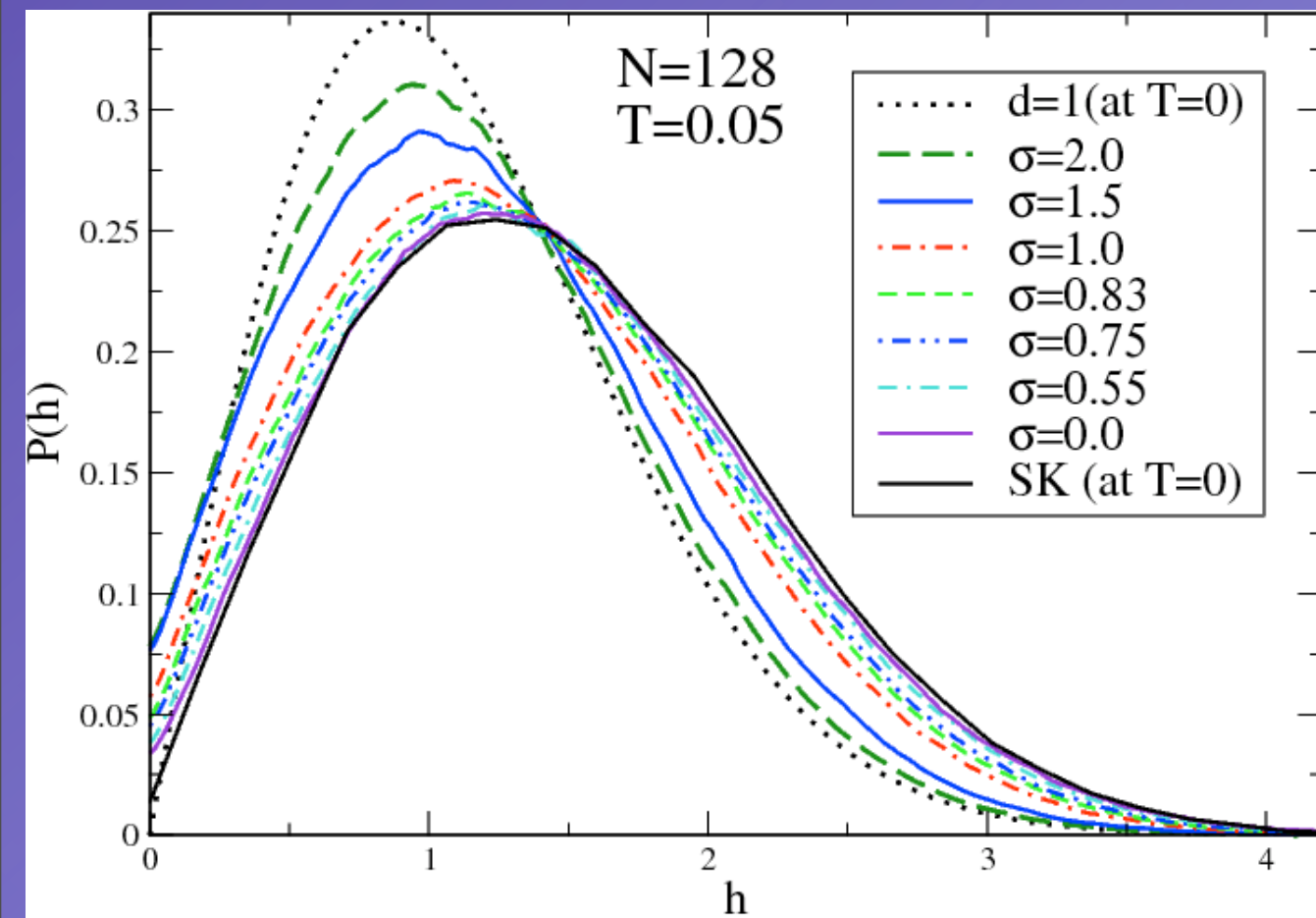


1d Long-Range:

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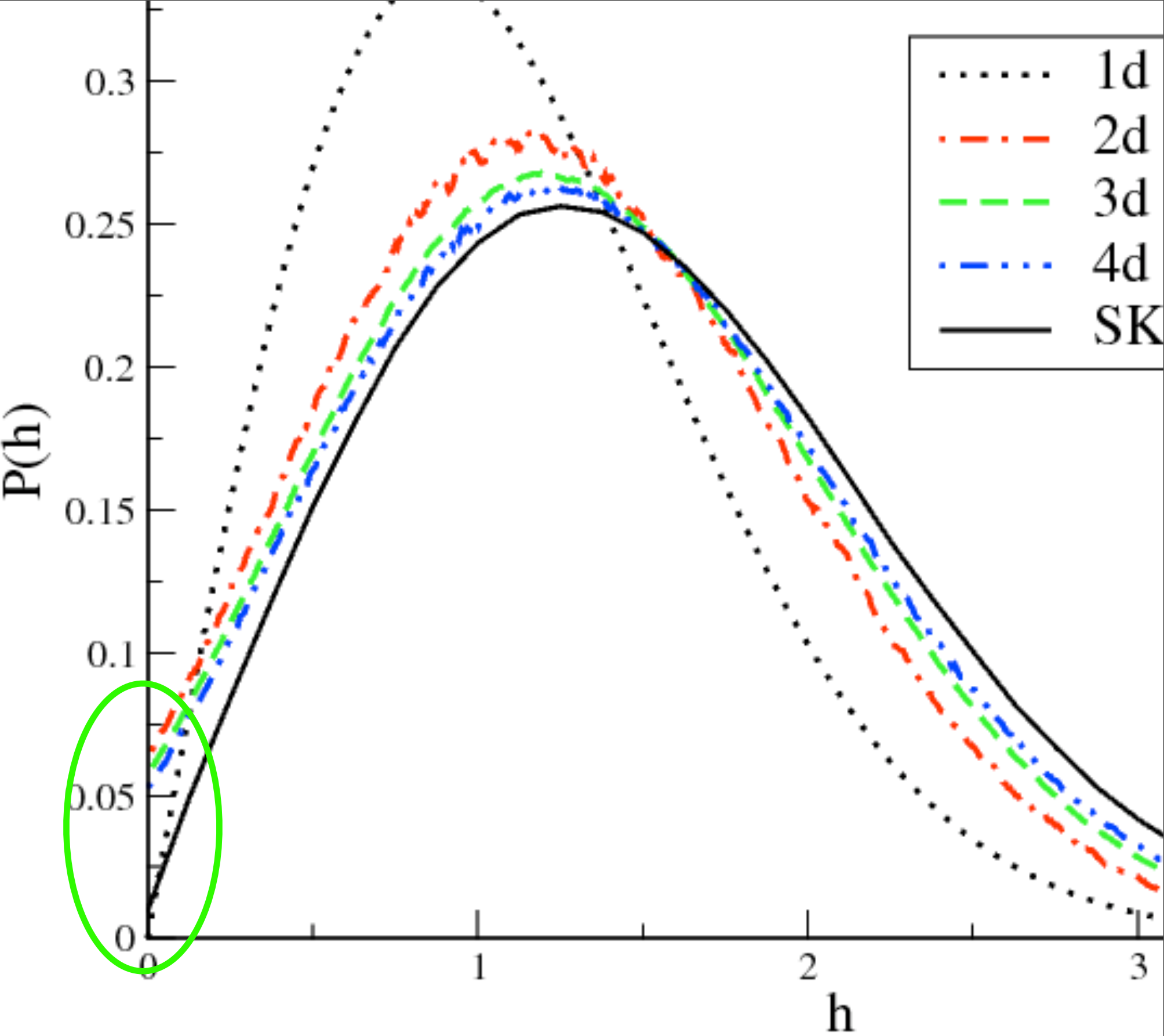
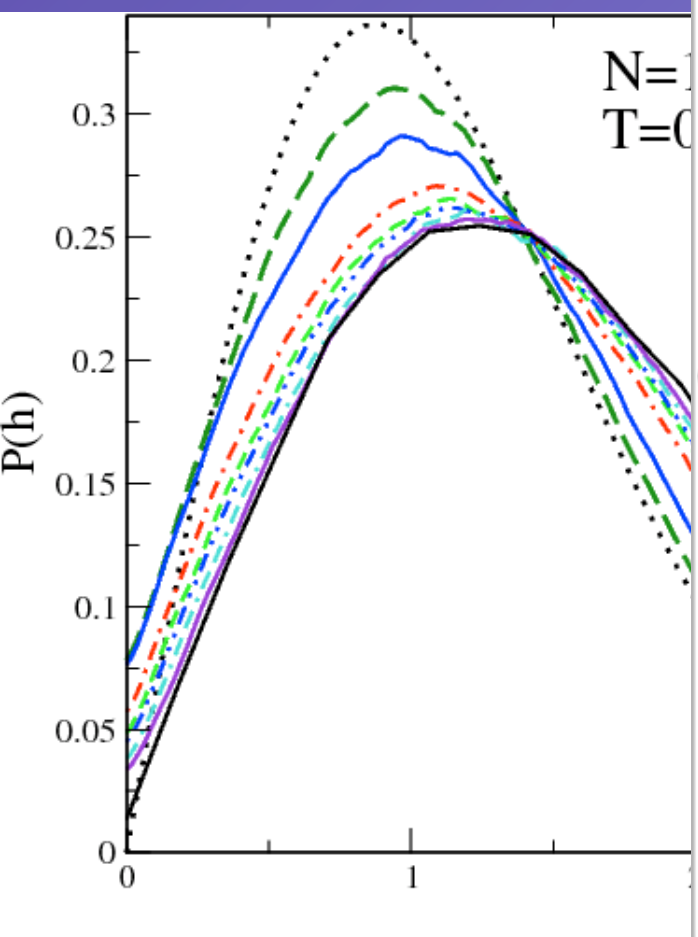
Fixed Size N , varying σ or d :





1d Long

Fi



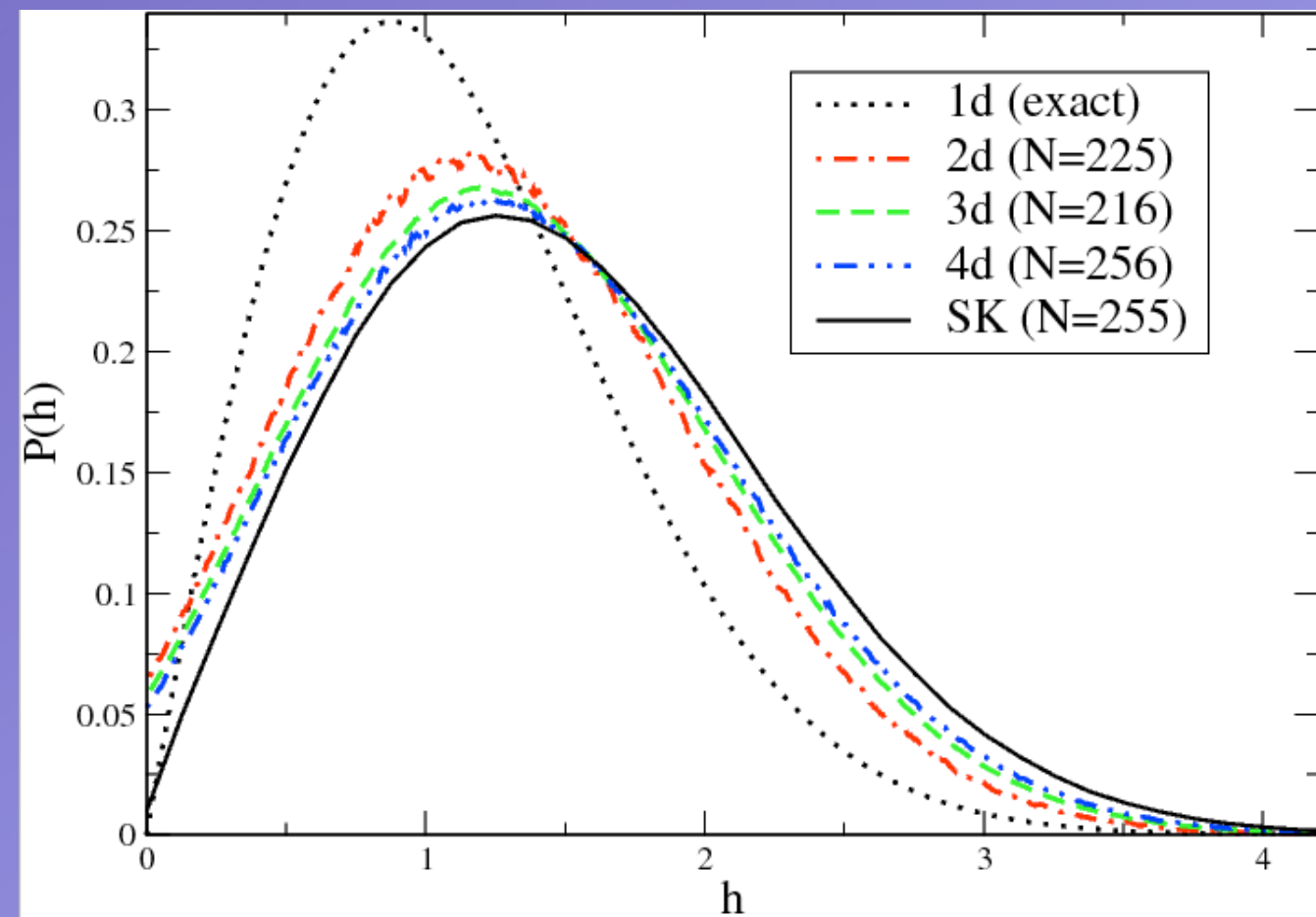
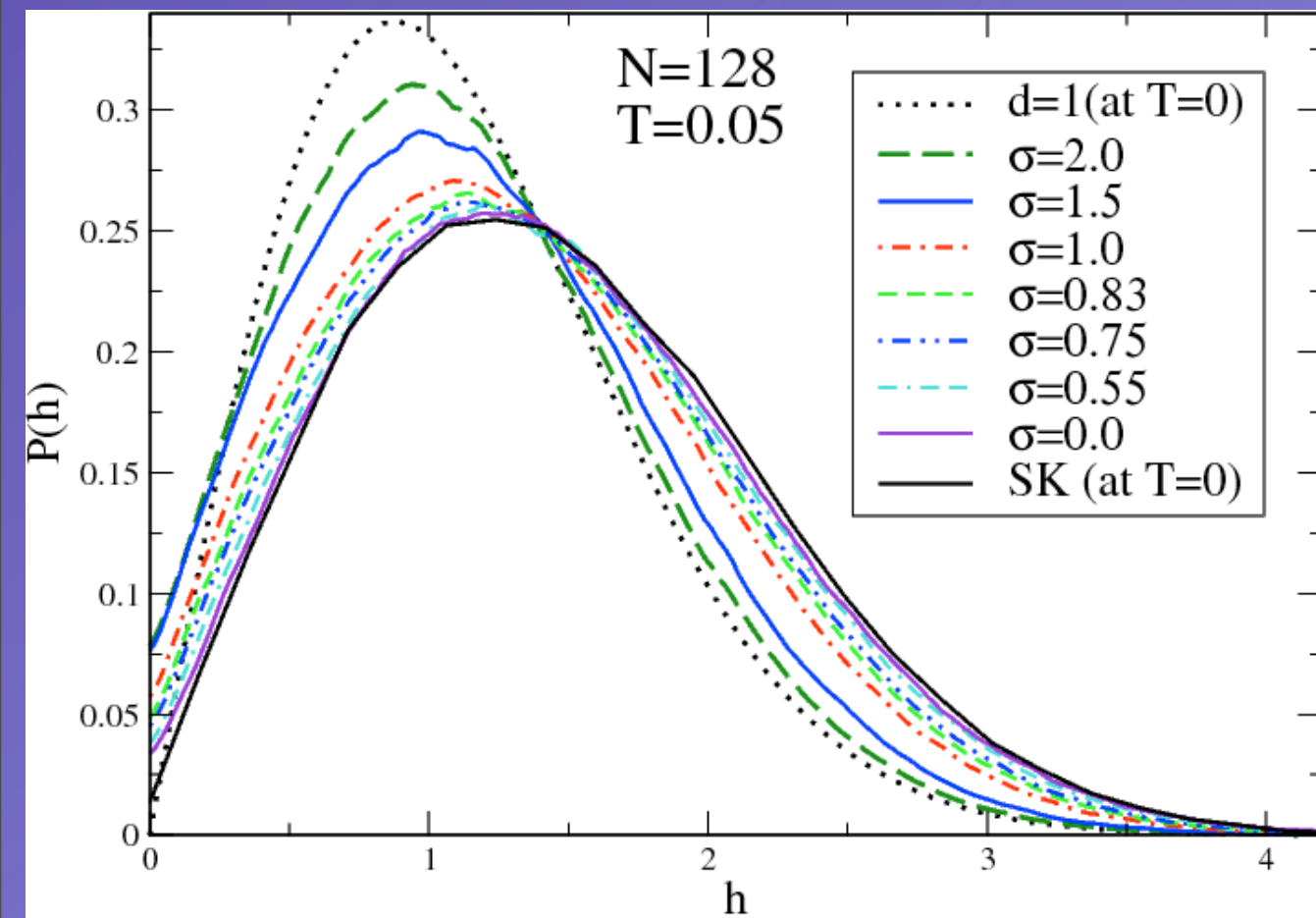


1d Long-Range:

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03-10-08

Fixed Size N , varying σ or d :





1d Long-Range:

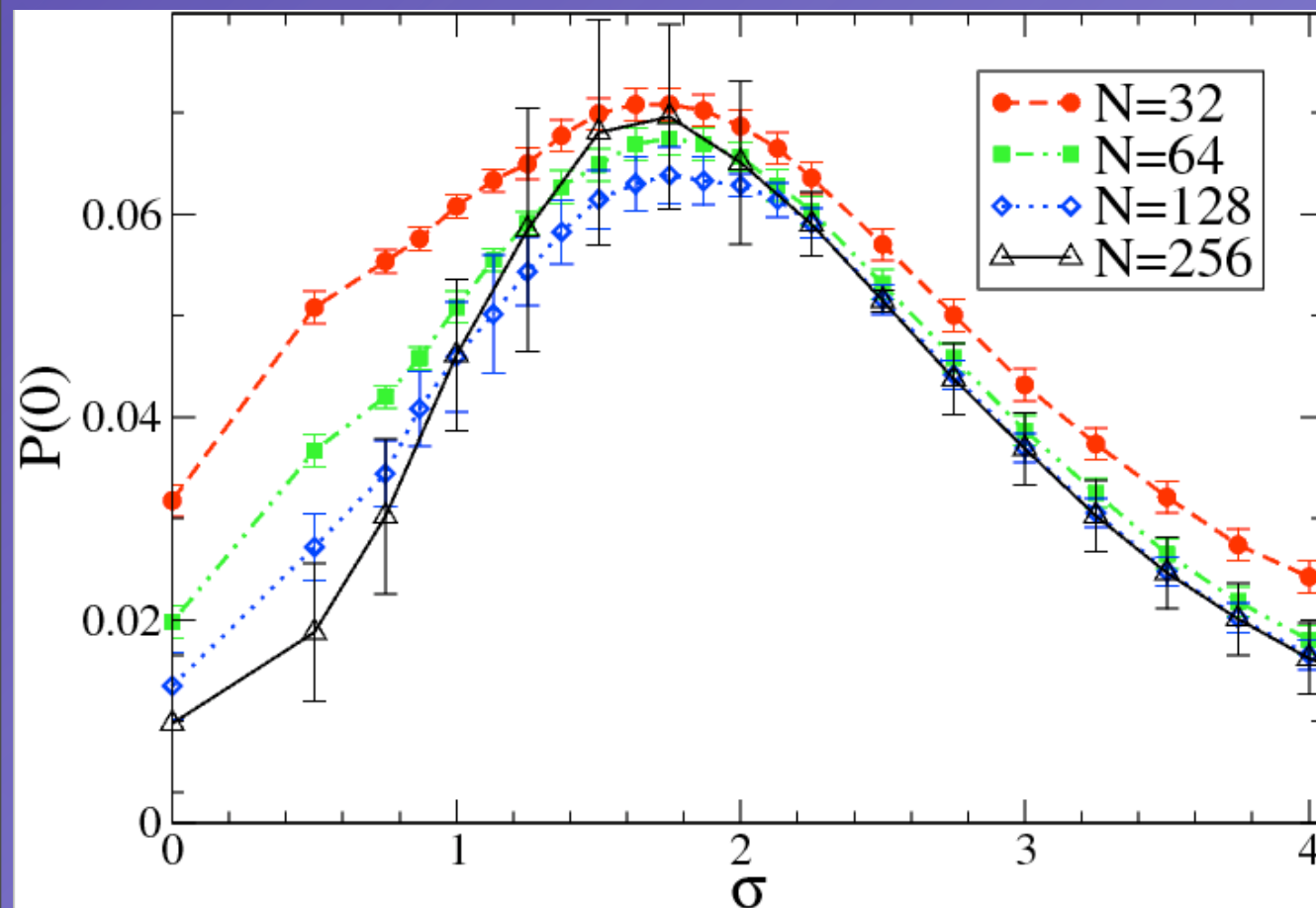
Edwards-Anderson:

03-10-08



1d Long-Range:

$P(0)$ for varying σ or d :



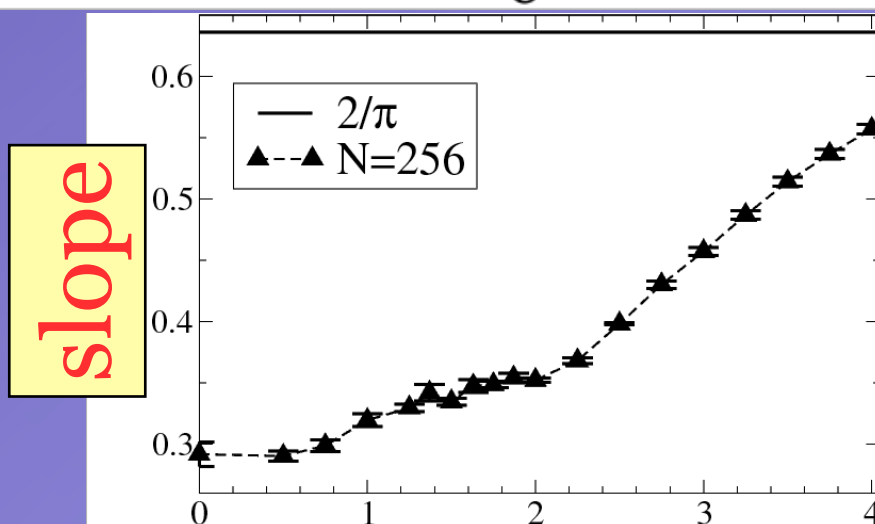
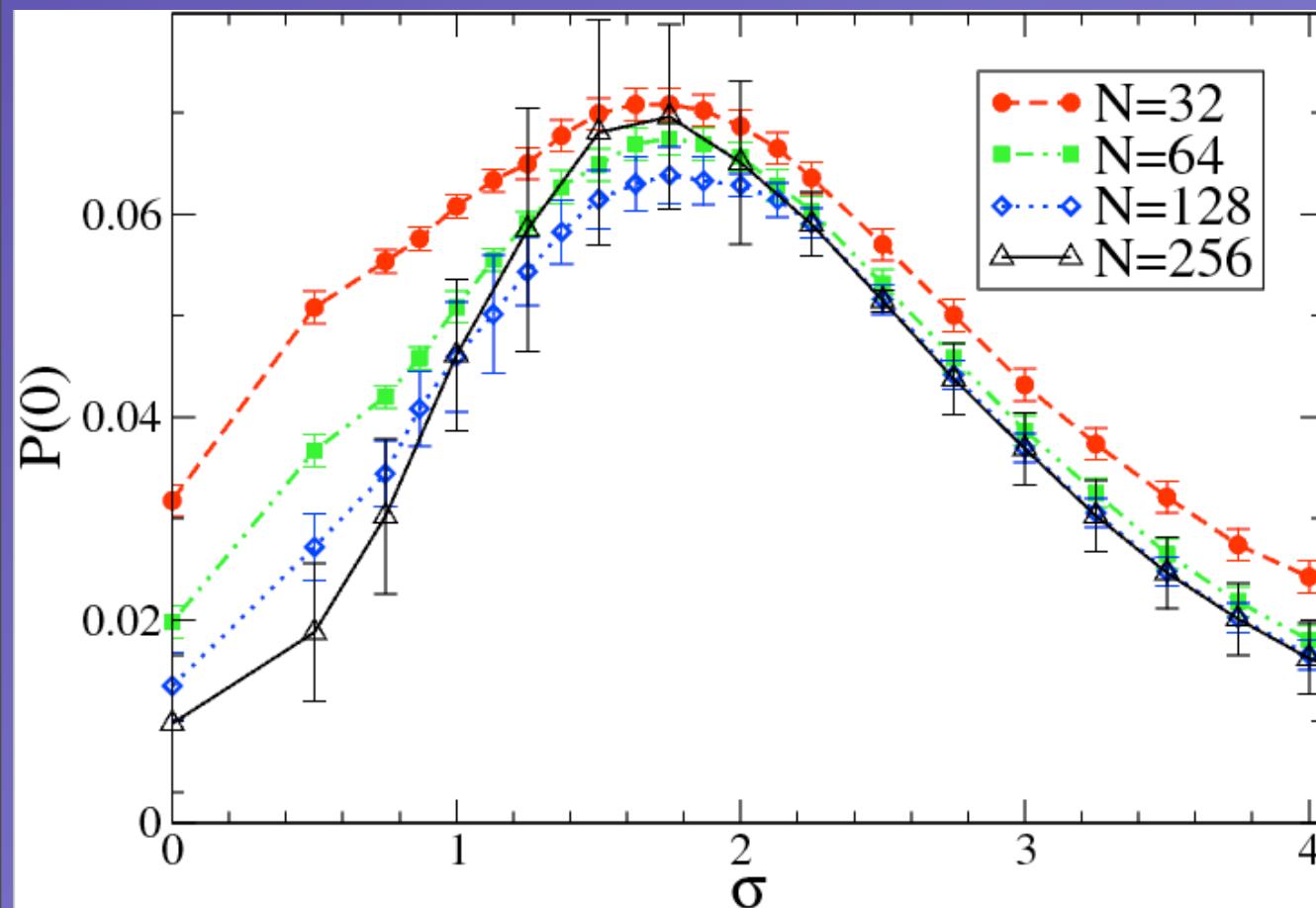
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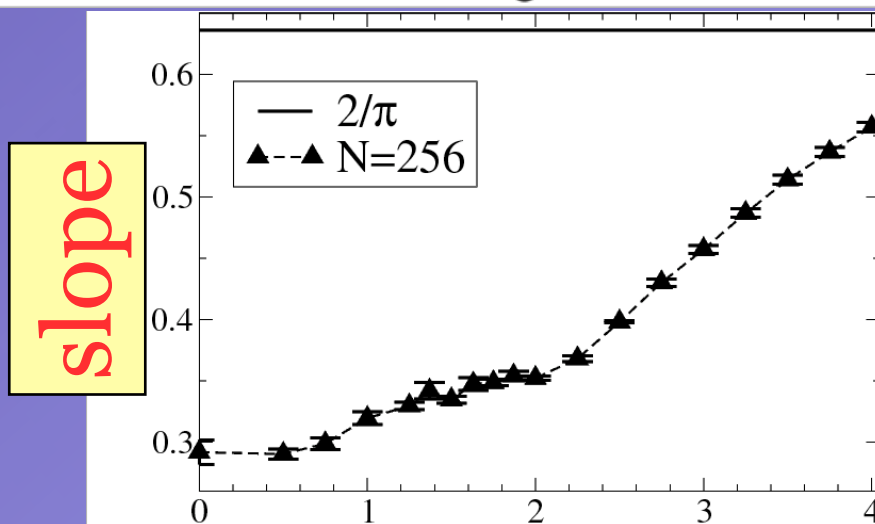
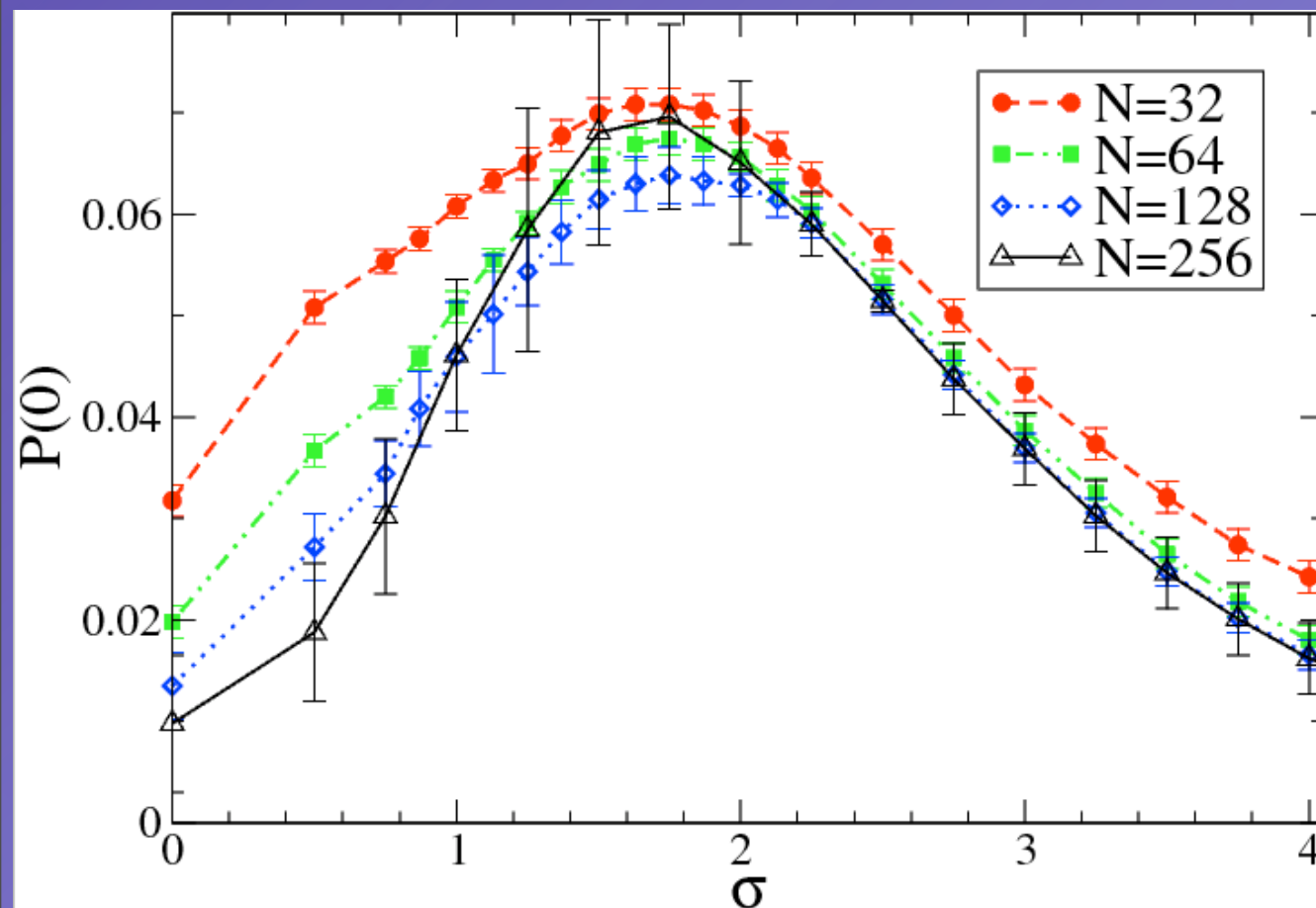
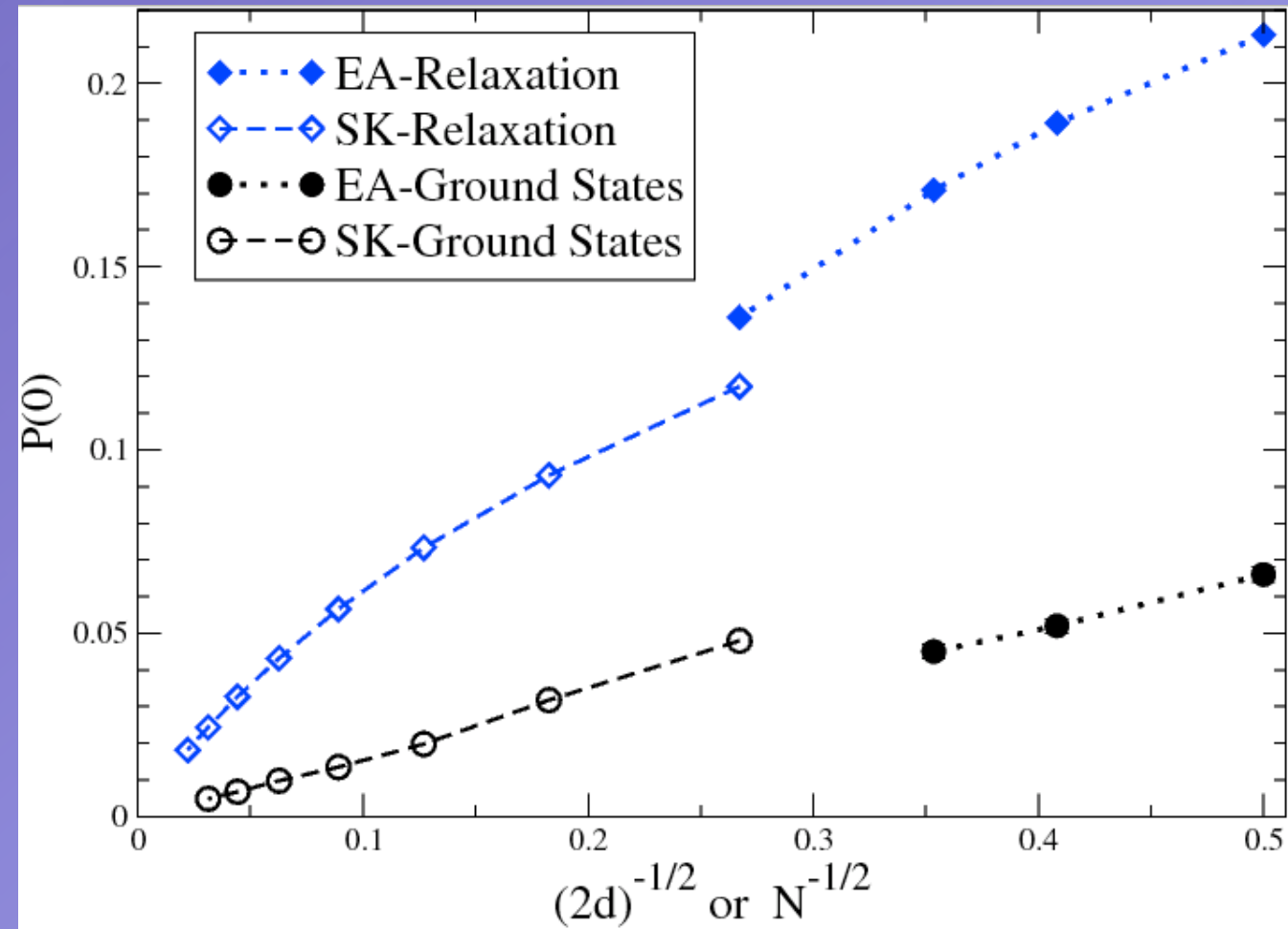


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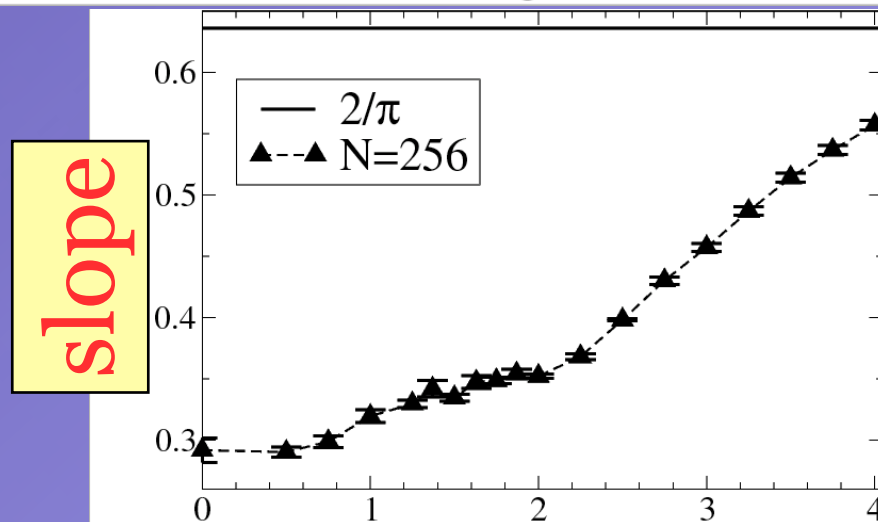
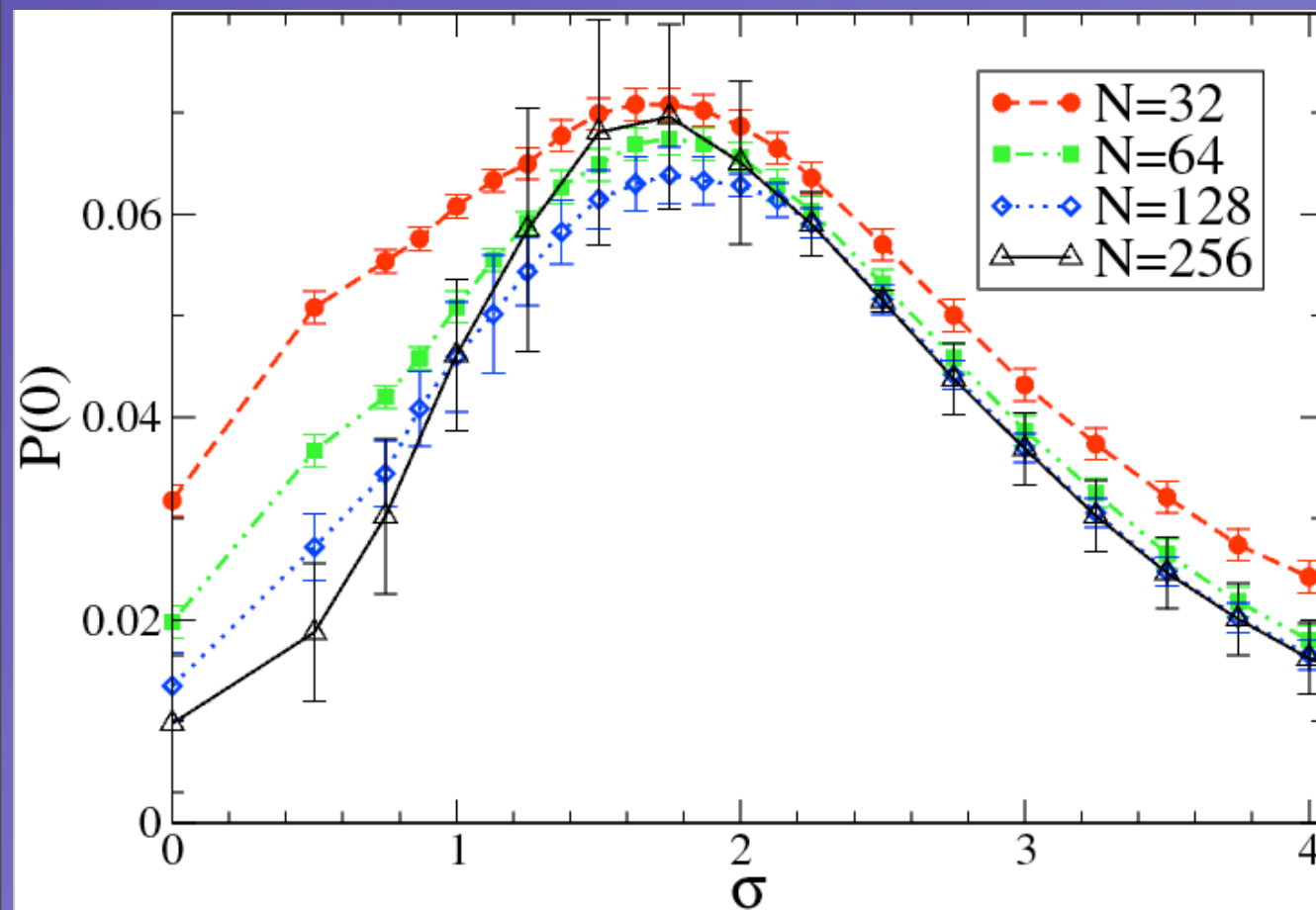
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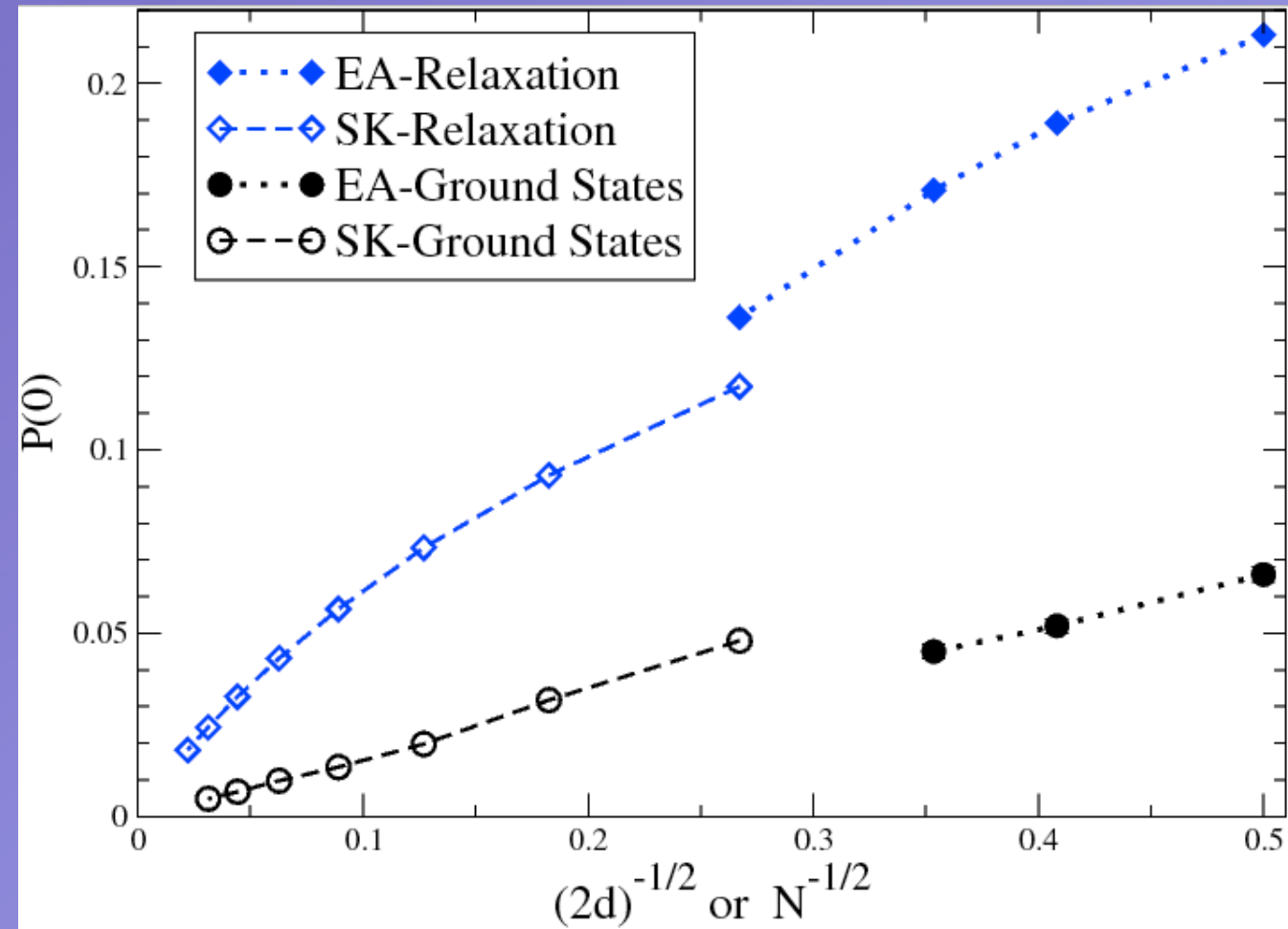
1d Long-Range: $P(0)$ for varying σ or d :Edwards-Anderson:

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$P(0)$ for varying σ or d :



Edwards-Anderson:



Connectivity: $2d=N-1$