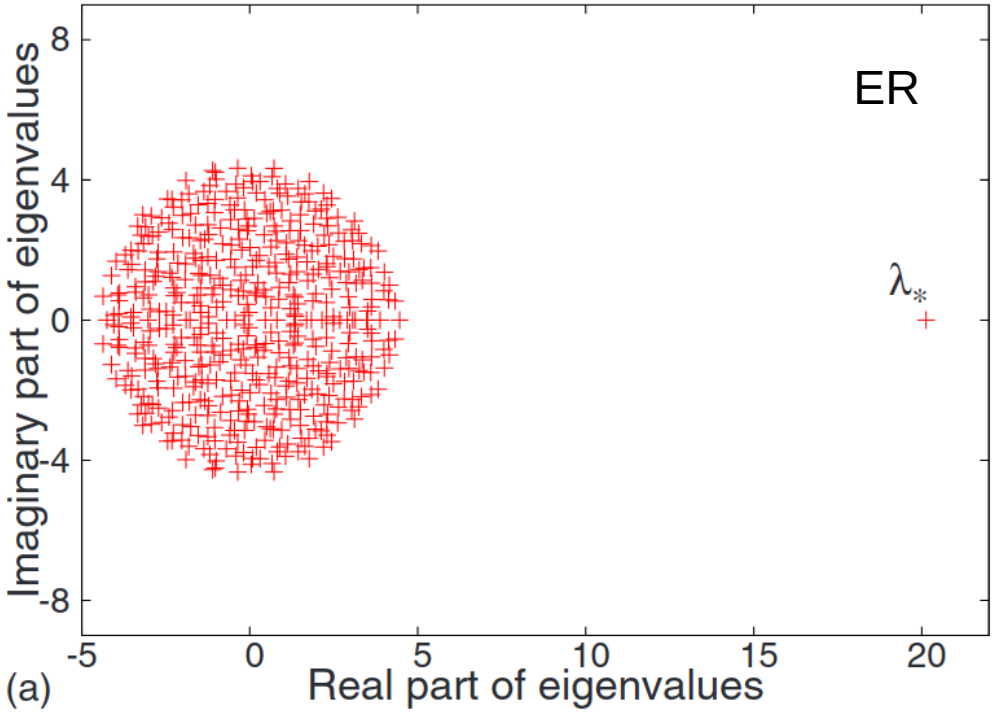
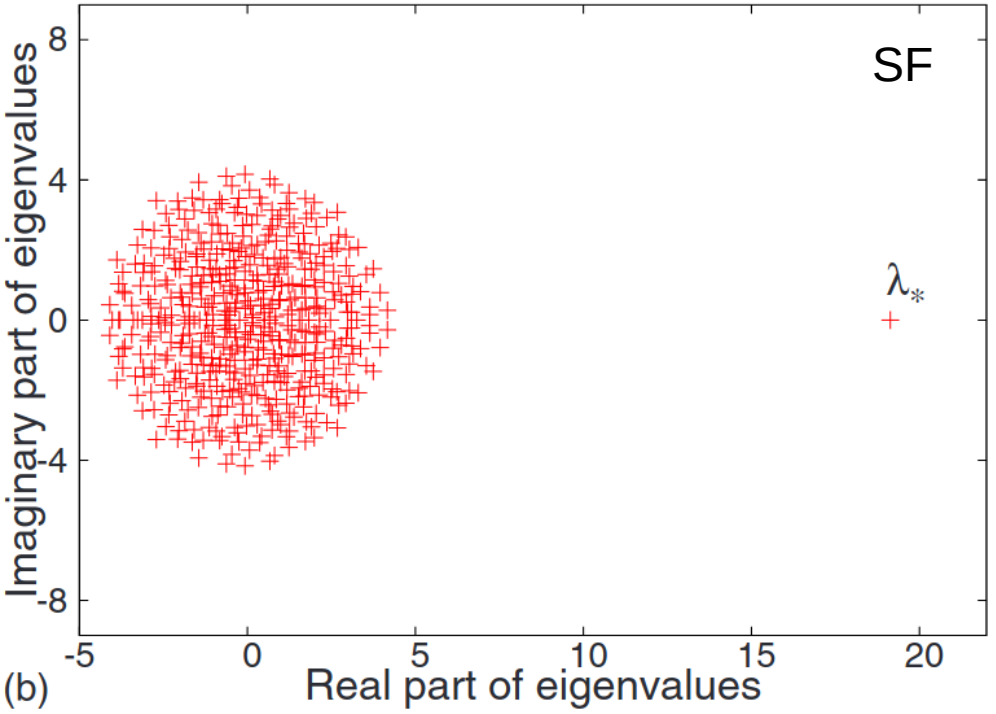
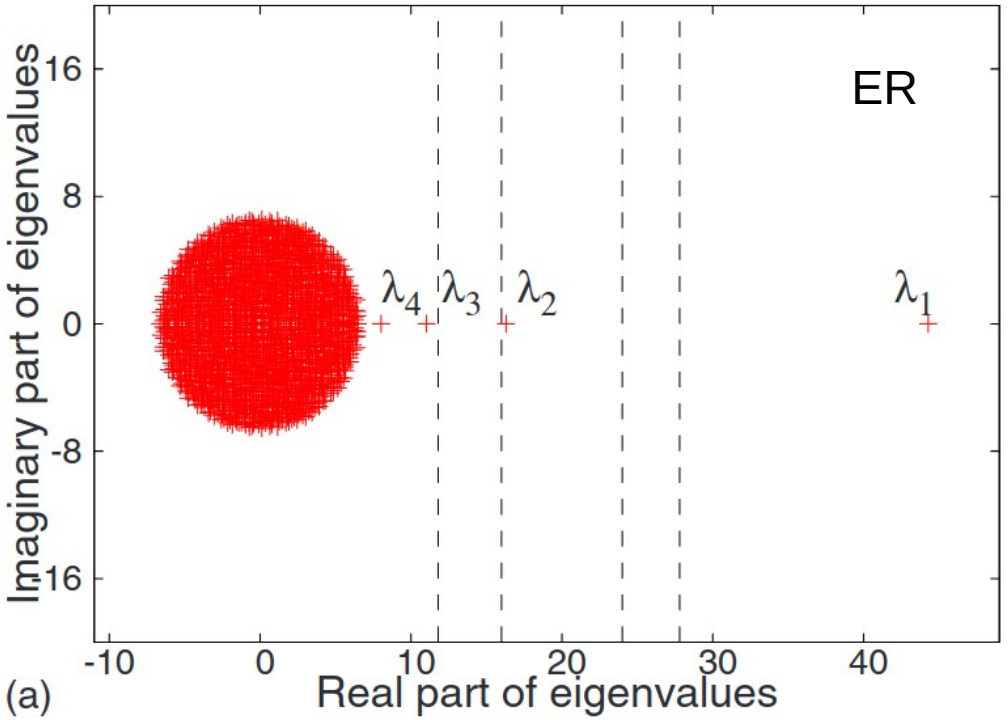
Eigenvalues of adjacency matrix
For network with directed edges (one community)

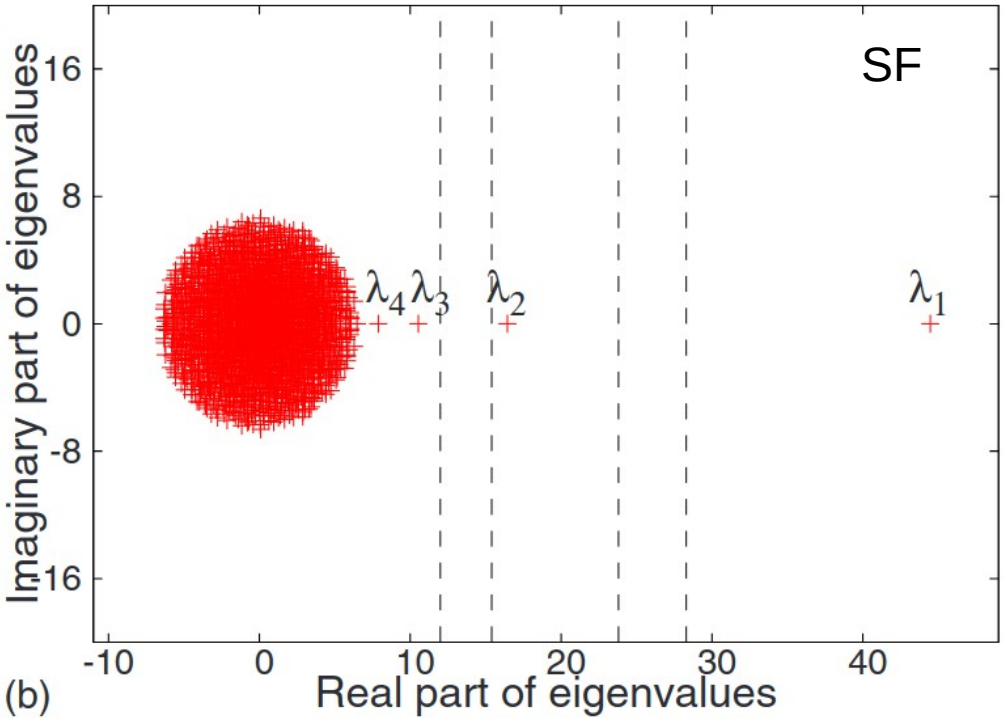




PHYSICAL REVIEW E 80, 056114 (2009)

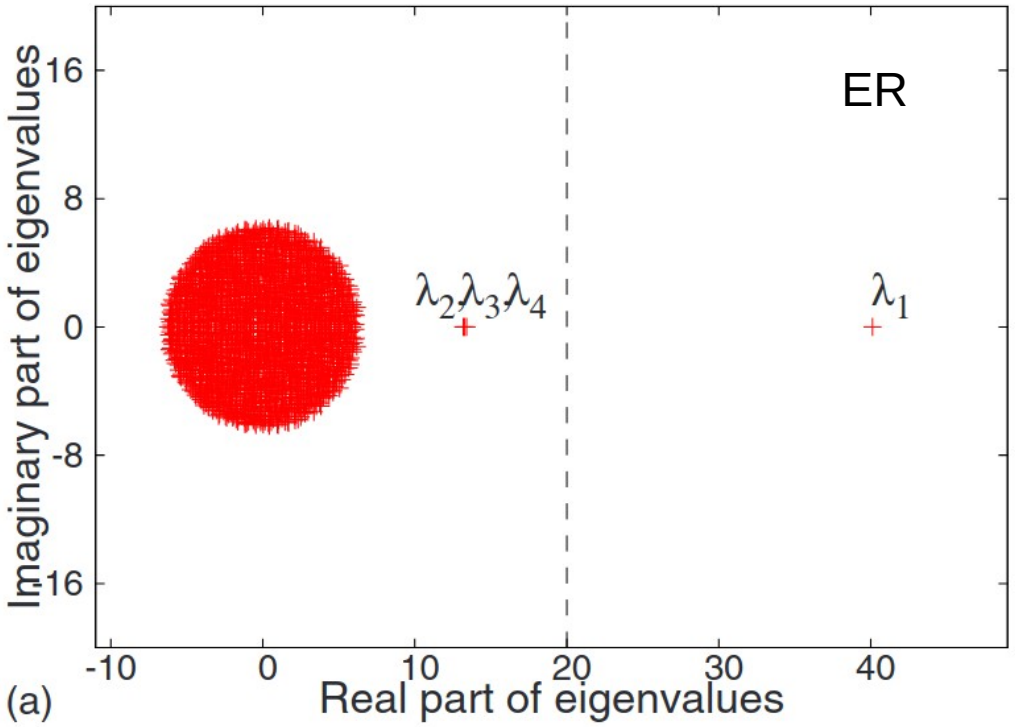
Eigenvalues of adjacency matrix
For network with directed edges
(four communities, size of communities different)

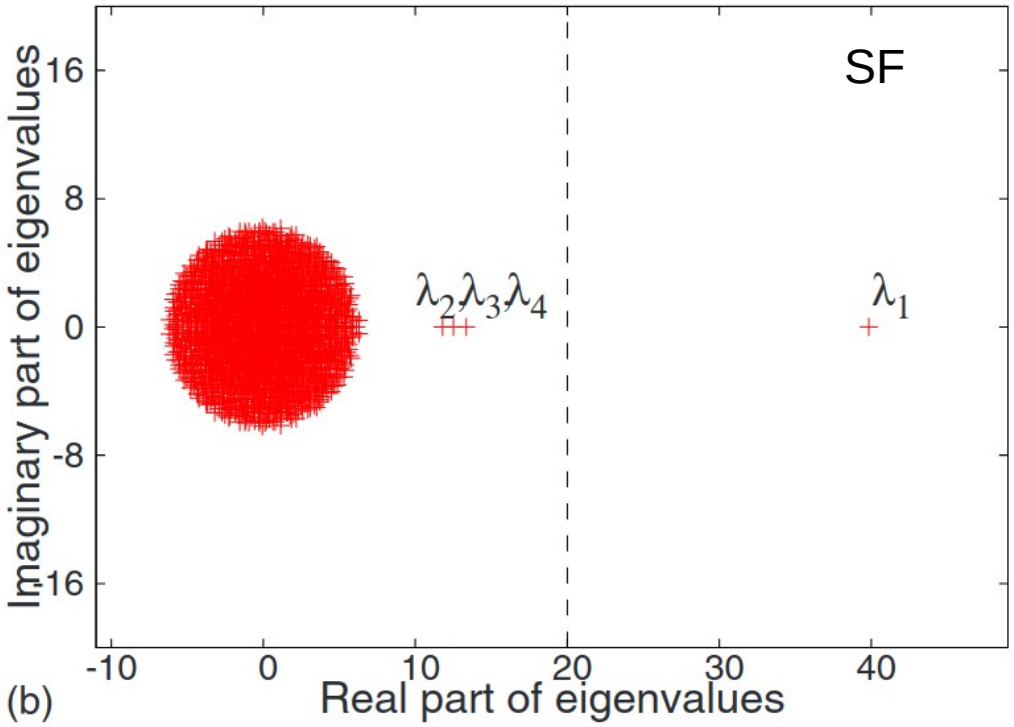




PHYSICAL REVIEW E 80, 056114 (2009)

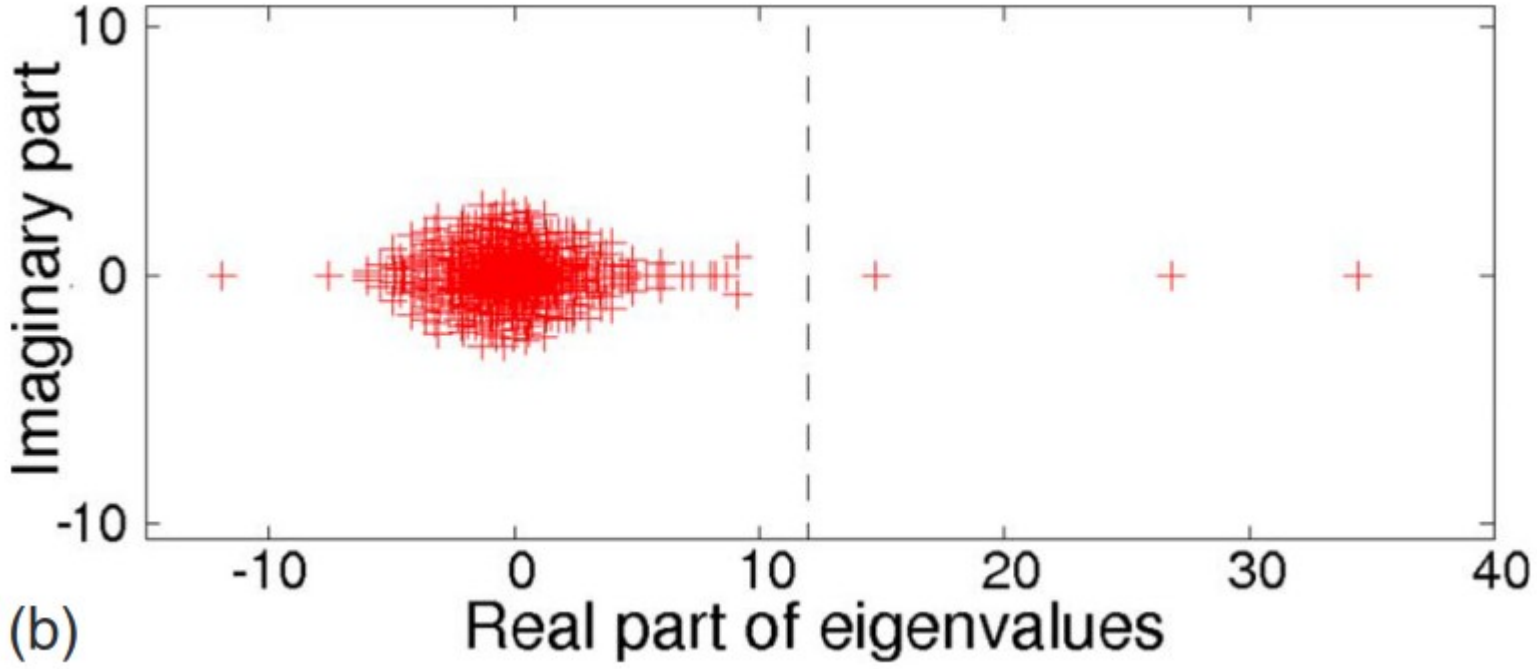
Eigenvalues of adjacency matrix
For network with directed edges
(four communities, size of communities same)



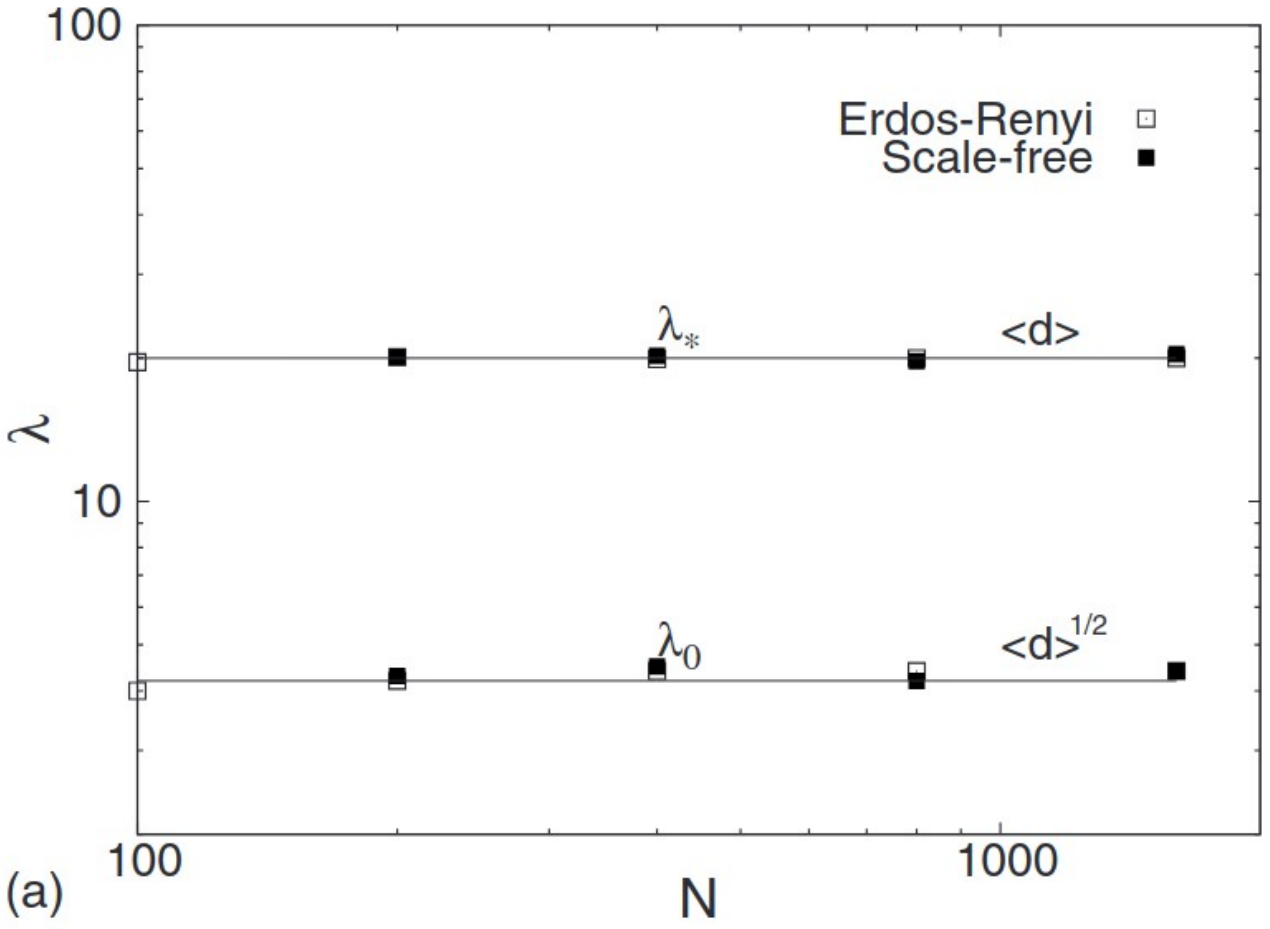


PHYSICAL REVIEW E 80, 056114 (2009)

Eigenvalues of adjacency matrix
For political blogs network with directed edges



PHYSICAL REVIEW E 80, 056114 (2009)


100
10
λ
100
1000
N
(a)
Erdos-Renyi
Scale-free
λ*
<d>
λ0
<d>1/2

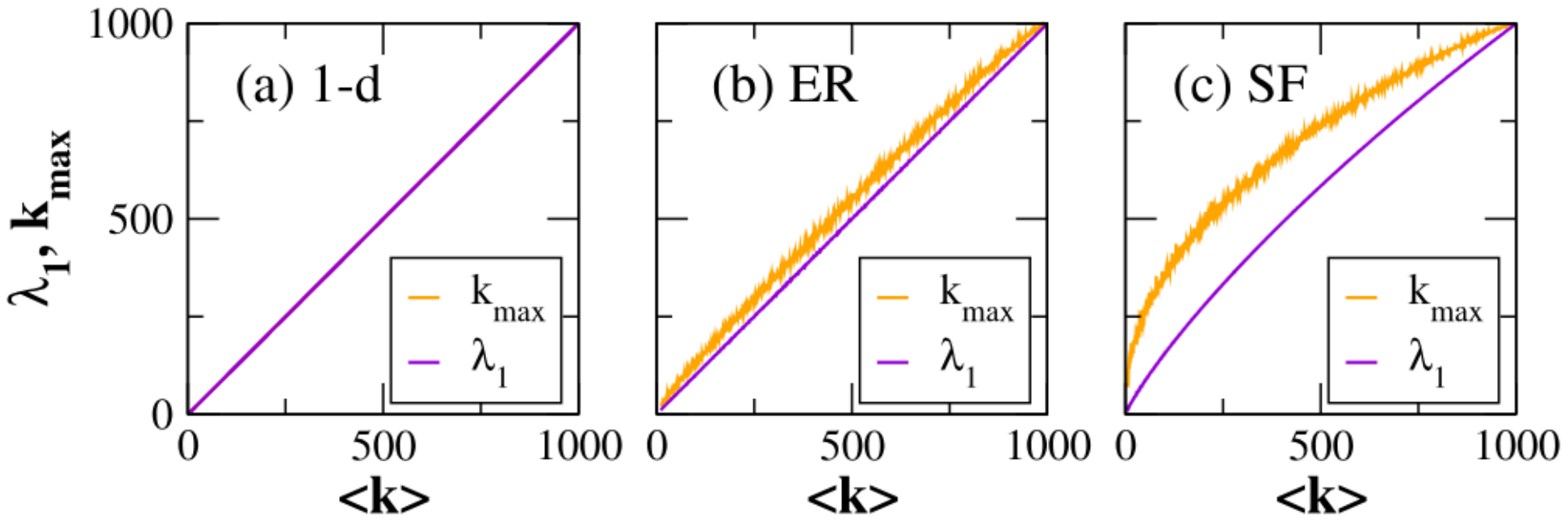
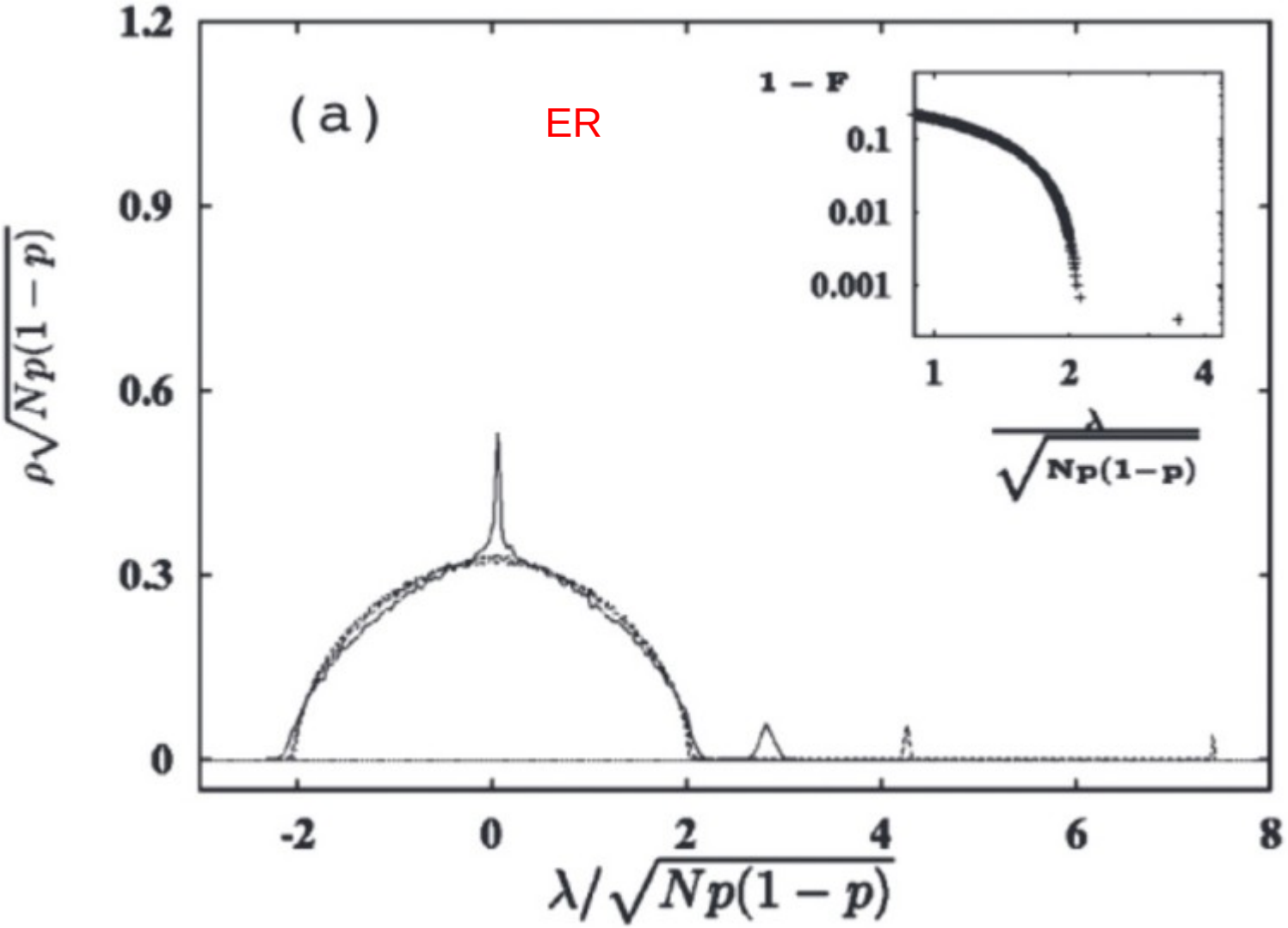


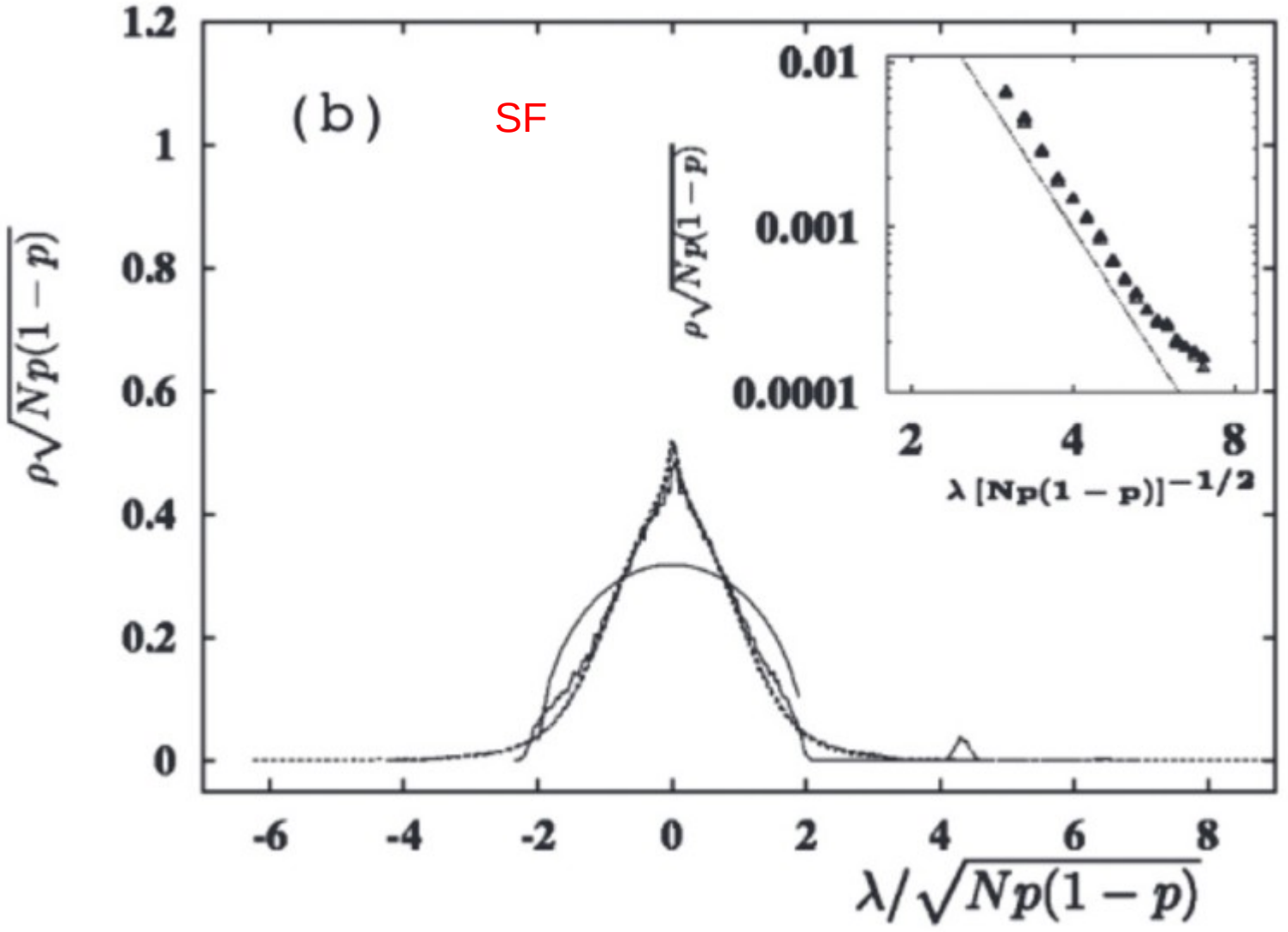
FIG. 1. Plots of the largest eigenvalue (λ_1) and the largest degree (k_{max}) as a function of average degree ($\langle k \rangle$) for (a) 1-d lattice, (b) ER random network, and (c) scale-free network, all having network size, $N = 1000$.

CHAOS 28, 102101 (2018)

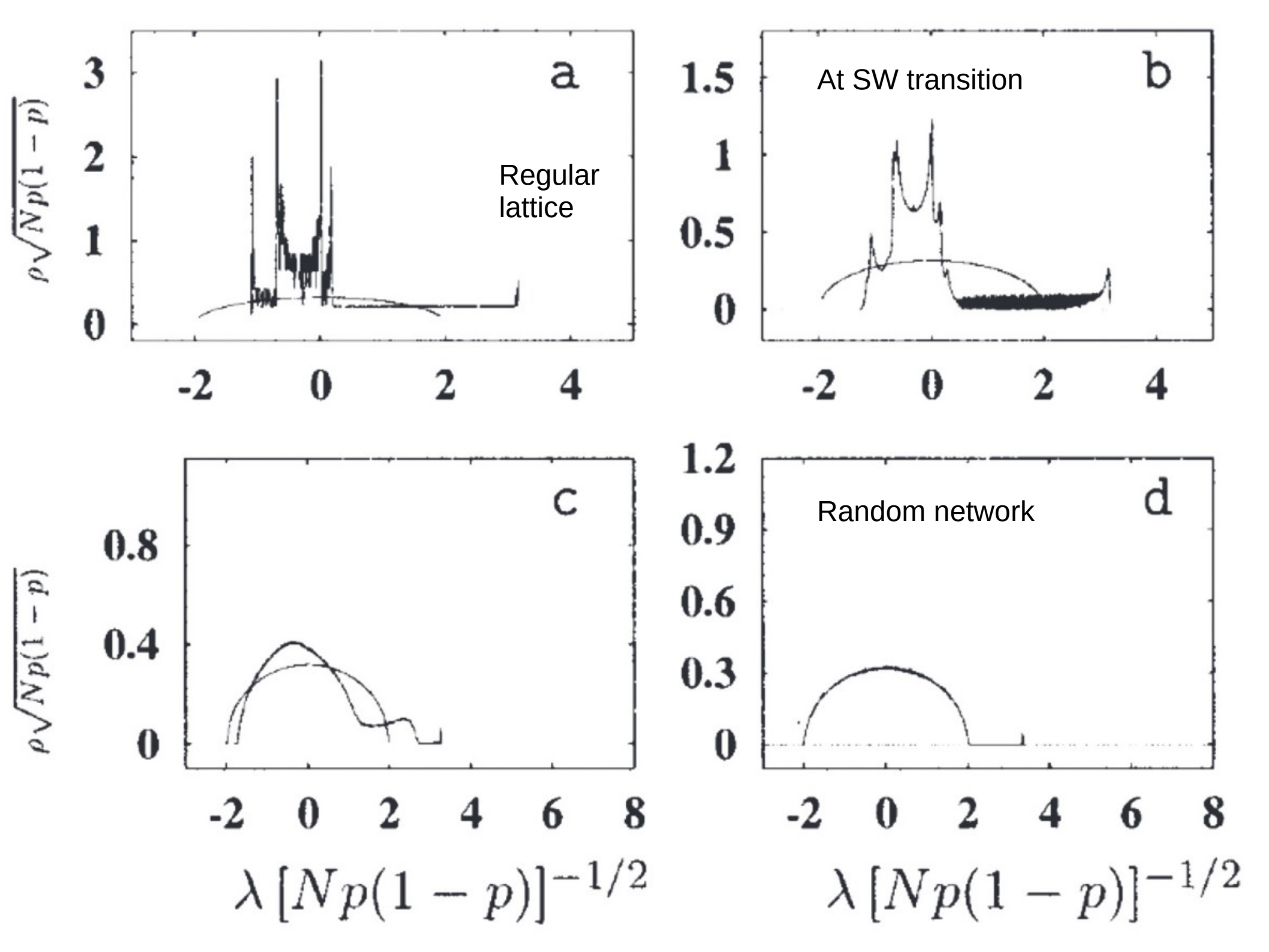
Wigner's semicircle law



Phys. Rev. E 64(2), 026704 (2001).

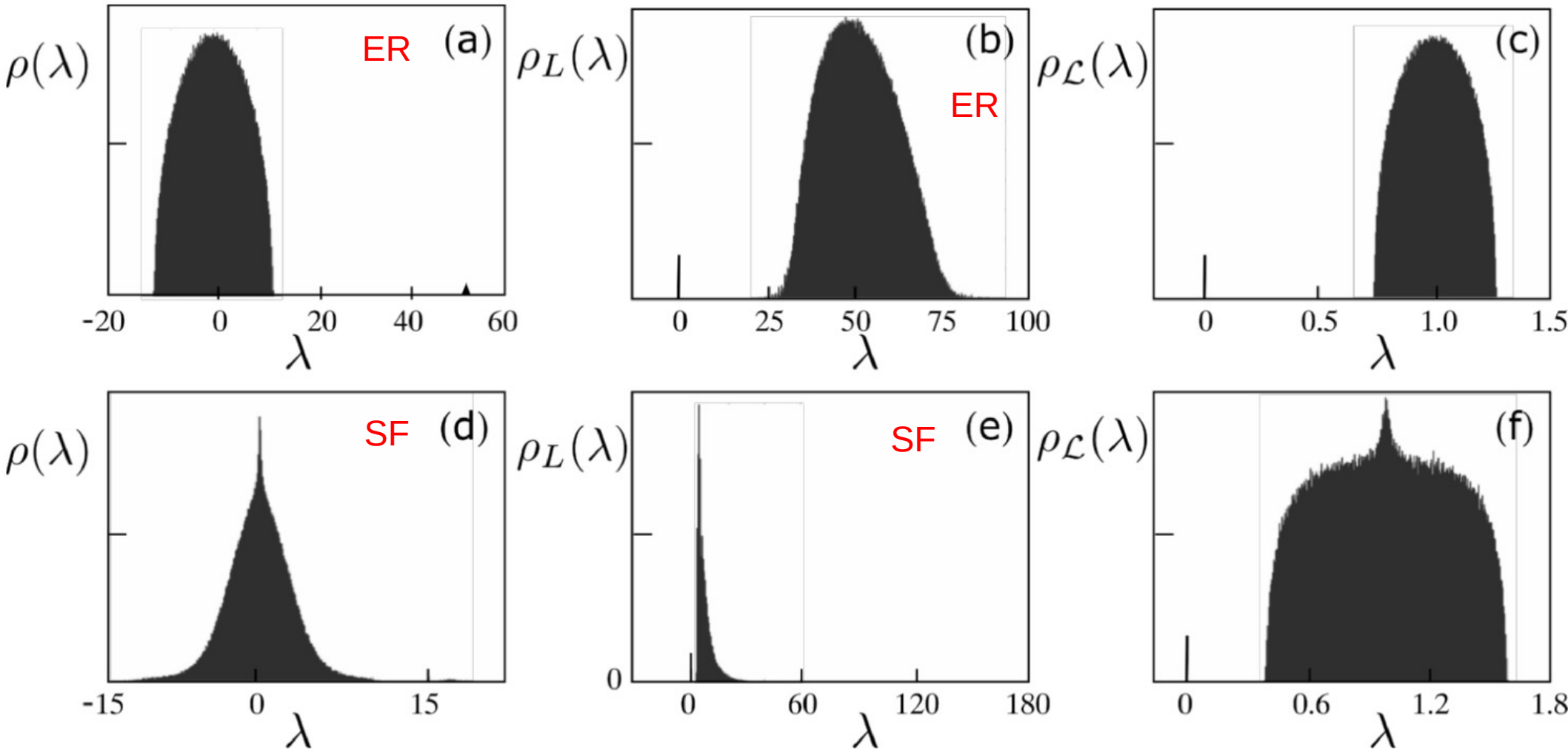


Phys. Rev. E 64(2), 026704 (2001).

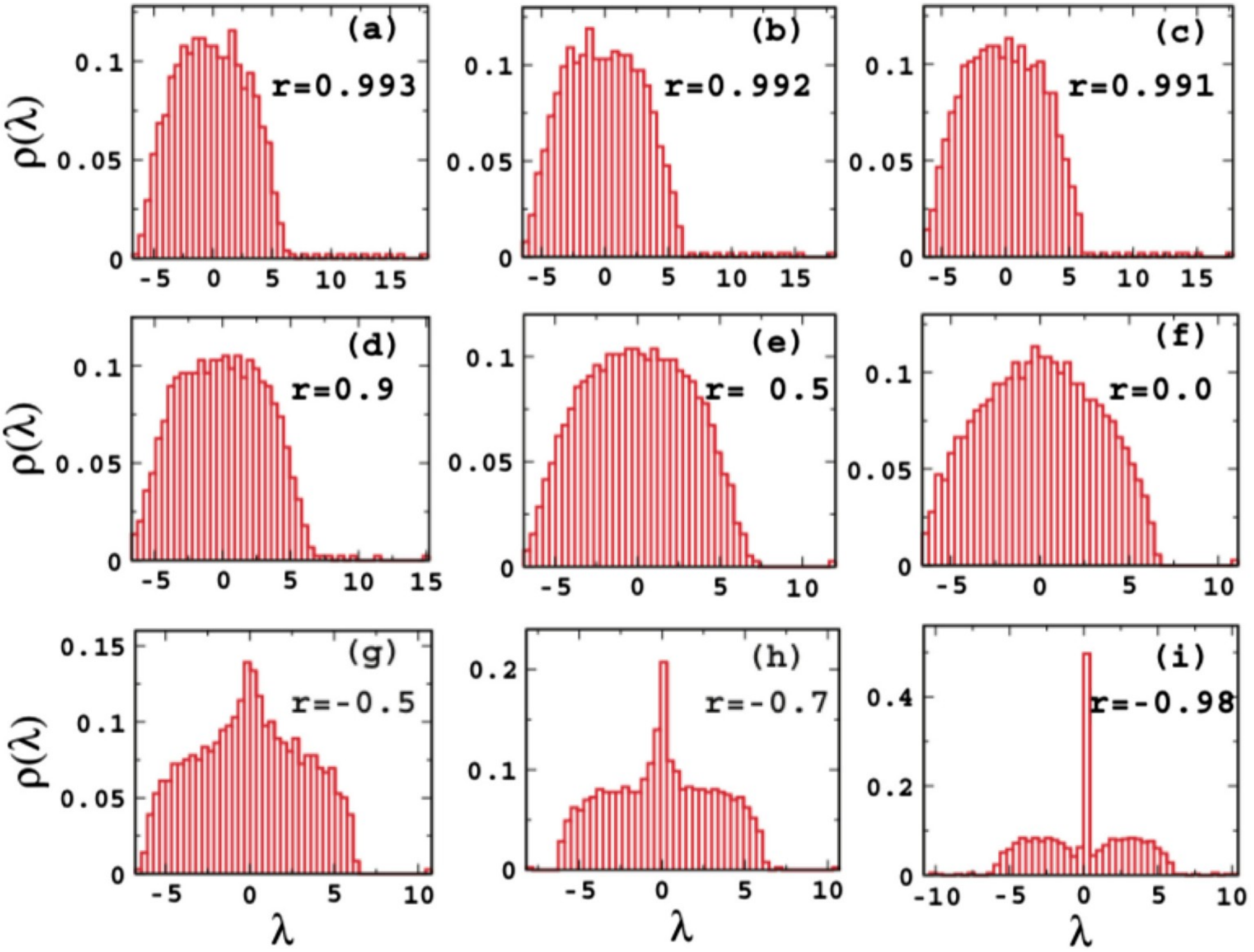

a
b
c
d
Regular lattice
At SW transition
Random network
$\rho\sqrt{Np(1-p)}$
$\lambda\,[Np(1-p)]^{-1/2}$
3
2
1
0
1.5
0.5
0.8
0.4
1.2
0.9
0.6
0.3
-2
0
2
4
6
8

Adjacency matrix

Lapalacian matrix

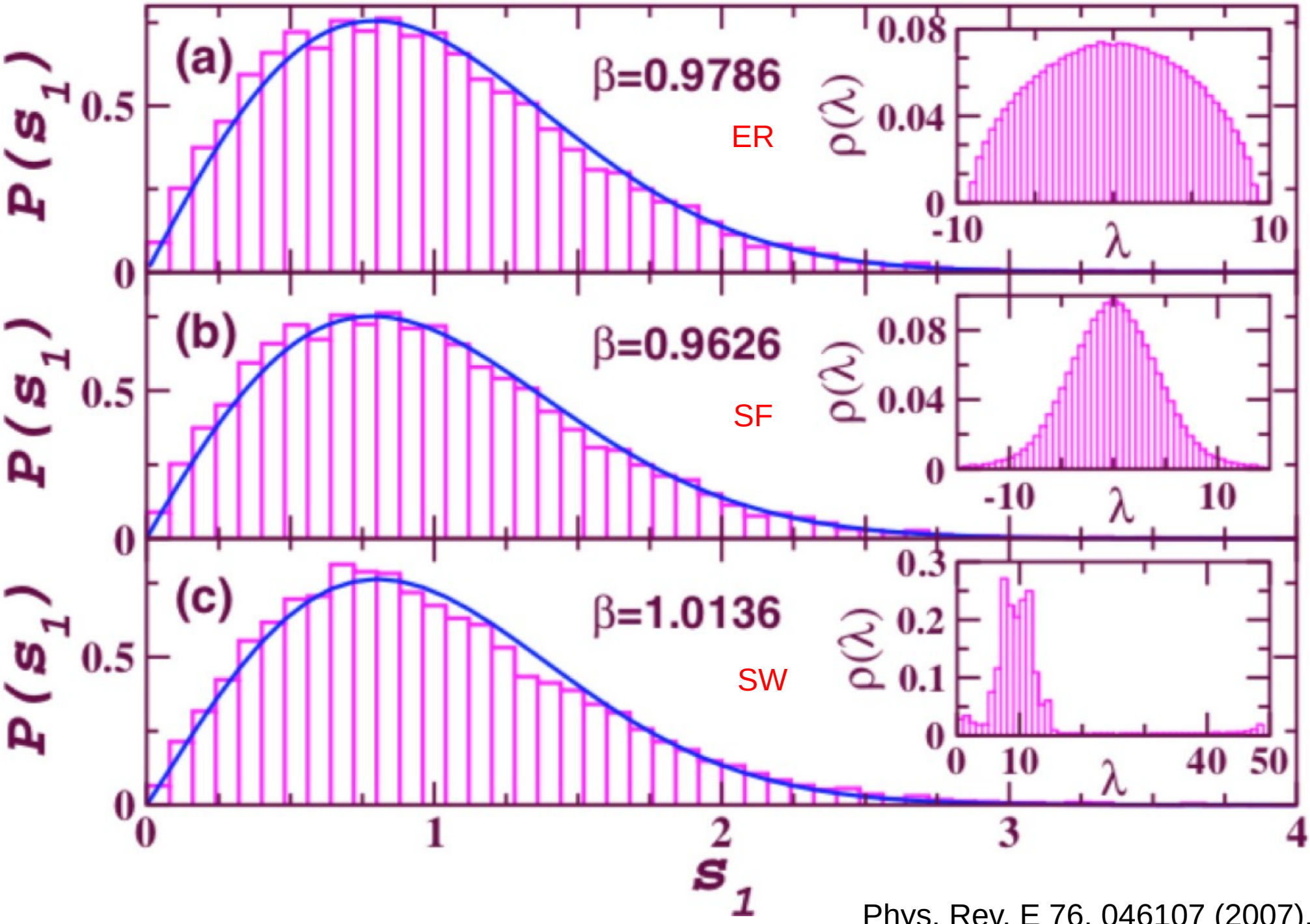


Nature of Complex Networks
D. N. Dorogovtsev and J. F. F. Mendes
(Oxford Univ Press, 2022)



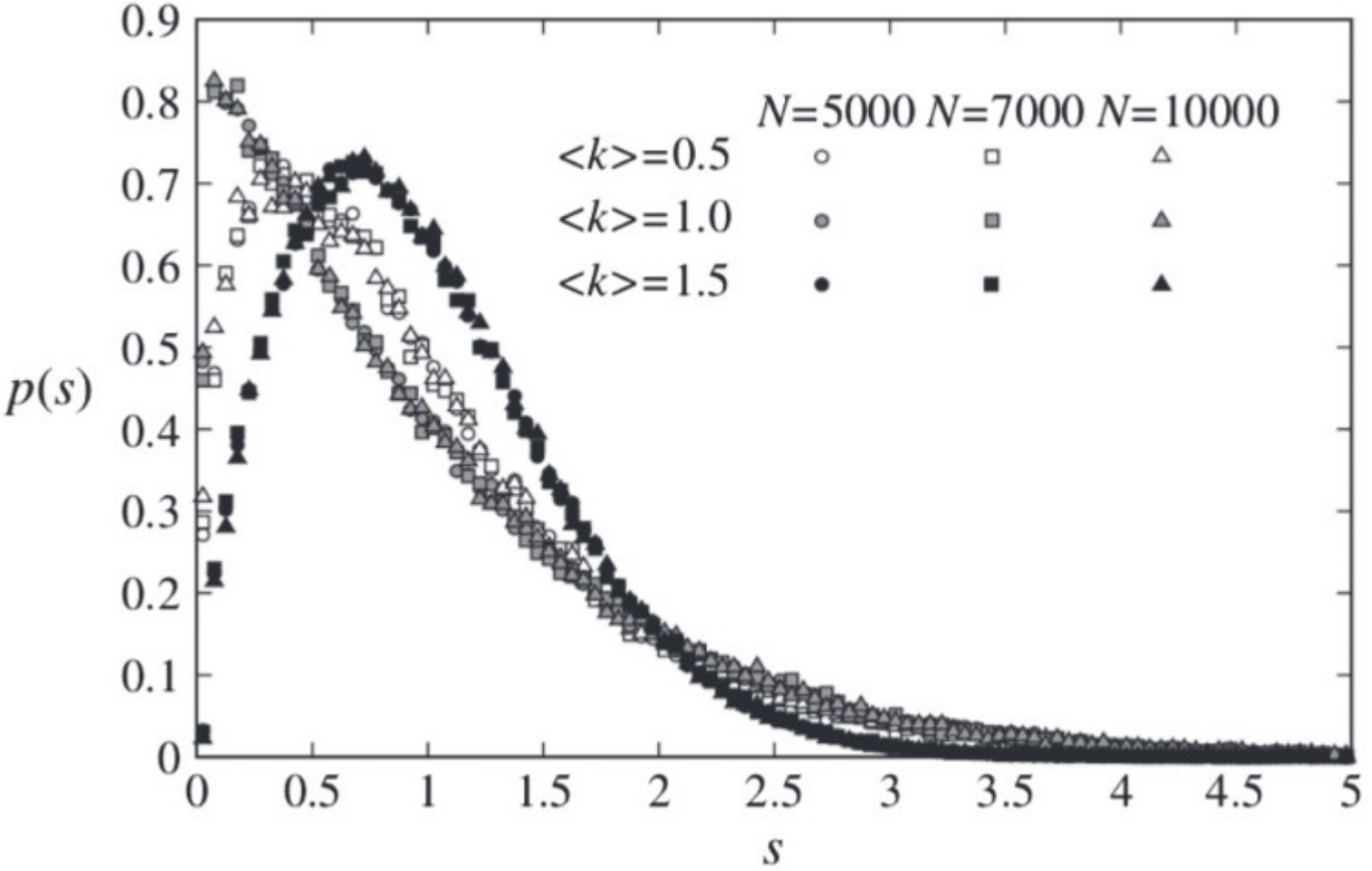
ER network : assortative vs. disassortative

Phys. Rev. E 91, 012813 (2015).



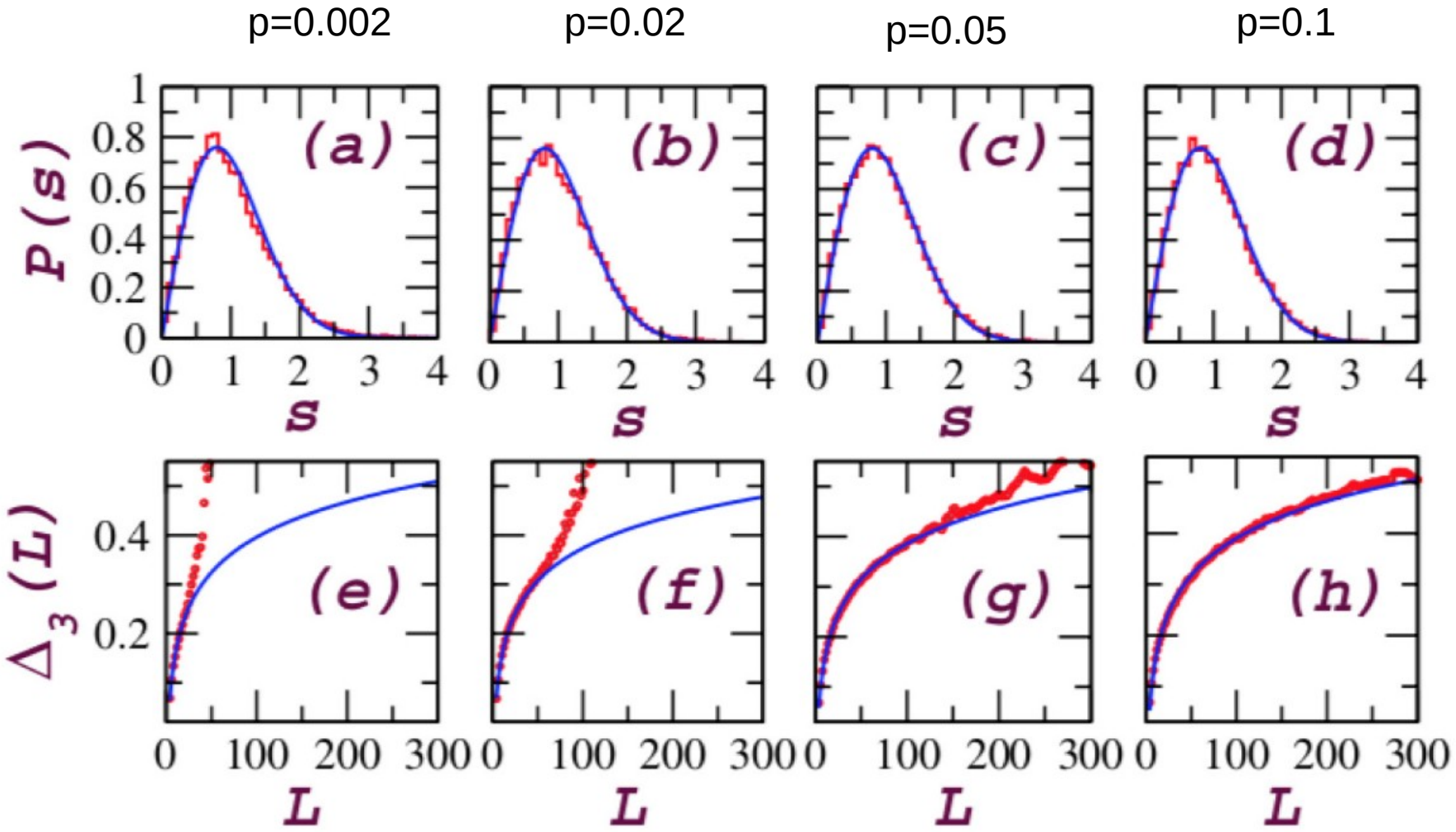
Phys. Rev. E 76, 046107 (2007).

ER

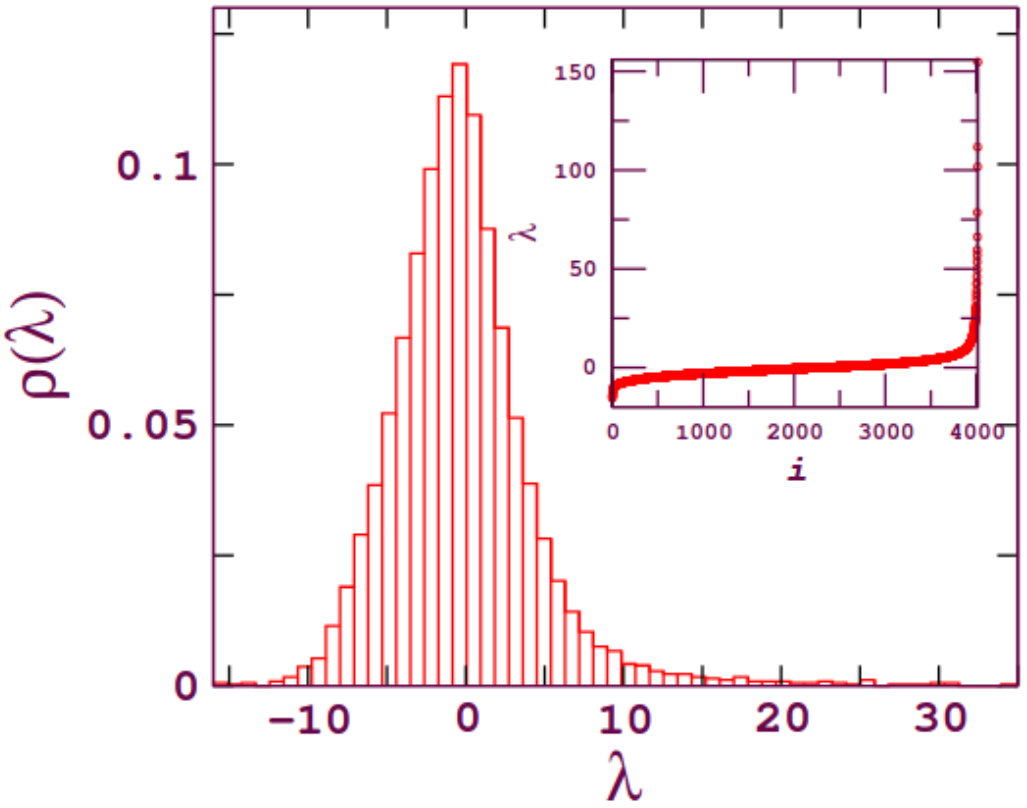


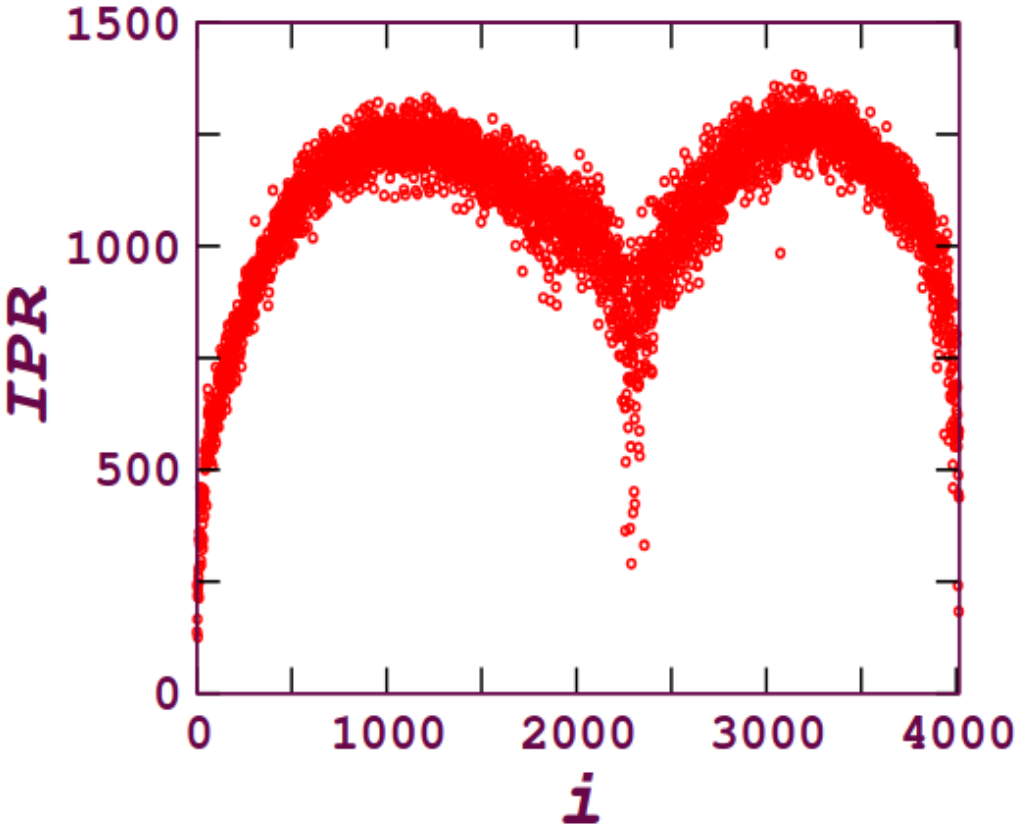
P(s) converges to Wigner for <k> > 1

New J. Phys. 8(12), 307 (2006).



Europhys. Lett. 87, 48010 (2009)





Gene coexpression network of Zebrafish

EPL 99 48004 (2012)