with $_j(t) = x_j$ and will show $\lim_t |\ _1(t) - \ _2(t)| = 0$. At $O(\ )$, we find Eq. (2) with a corresponding linear operator $Lu = cu' - u + w \ [f'(U) \cdot u]$. Solvability is enforced by ensuring the right-hand side of Eq. (2) is orthogonal to the null space V of the adjoint $L^* p = -cp' - p + f'(U) \cdot w(-\ ) \ p(\ )$, yielding the Langevin equation, Eq. (4). The Lyapunov exponent associated with the stability of the absorbing state $_1(t) = \ _2(t)$ is then approximated by Eq. (14).

To compare our analytical results for traveling waves with numerical simulations, we compute from Eq. (14) when $f(u) = H(u - \ )$, $w(x) = \cos(x - \ )$, and $C(x) = \cos(x)$. Stable traveling waves have a profile $U(\ ) = \cos \ [\sin \ - \sin(\ + a)]$, width $a = \ - \sin^{-1}[\ \sec \ ]$ defined by thresholds $U(\ _1) = U(\ _2) = \ $ where $_1 = \ - a$ and $_2 = -\ $, and speed $c = \tan \ $ [28]. The null vector can also be computed explicitly:

$$V(\ ) = \sum_{k=1}^{2} (-1)^k \ H(\ - \ _k) + \frac{\coth(\ /c\ ) - 1}{2} \ e^{(\ _k - \ )/c}.$$

Fourier coefficients of $W(\ ,t\ )$ in Eq. (6) are thus given $b_{\pm 1} = (1 \ c)/$

so $\langle W(\ ,\ )\rangle = 0$; $\langle W(\ ,\ )\ W(\ ,\ )\rangle = 2C(\ -\ )(\ -\ )$ $(= 1,2,c)$ with $C(\ ) = \sum^{\infty}_{=0} a \cos(\ )$. The degree of correlation between layers is controlled by the parameter .

Our analysis proceeds by considering stationary bumps in a network with even symmetric connectivity [( ) = (−)]. As in the main text, we characterize stochastic bump motion by applying the ansatz $(\ ,\ ) = U(\ - \Delta(\ )) + \varepsilon\Phi(\ - \Delta(\ ),\ ) + O(\varepsilon^2)$, and $\Delta(0) =$. Plugging this ansatz into Eq. (A1), expanding to $O(\varepsilon)$, and applying a solvability condition, we find that each Δ $(= 1,2)$ obeys the Langevin equation

$$\Delta = \varepsilon \frac{\int V(\ )\ (\ -\Delta(\ ),\ )}{\int V(\ )}$$

V(ct)9.9Tm0Tc(c)Tj/F11Tf9.9626009.9626171.474581.4301Tm(()Tj/F41Tf.33330TD(x)Tj/F53j6.4D6((6/F4()Tj/F41

[1] S. Jakubith, H. H. Rotermund, W. Engel, A. Von Oertzen, and G. Ertl, Phys. Rev. Lett. **65**, 3013 (1990).
[2] N. E. Huang, Z. Shen, and S. R. Long, Annu. Rev. Fluid Mech. **31**, 417 (1999).
[3] T. Danino, O. Mondragón-Palomino, L. Tsimring, and J. Hasty, Nature (London) **463**, 326 (2010).
[4] D. A. Cummings, R. A. Irizarry, N. E. Huang, T. P. Endy, A. Nisalak, K. Ungchusak, and D. S. Burke, Nature (London) **427**, 344 (2004).
[5] X.-J. Wang, Physiol. Rev. **90**, 1195 (2010).
[6] D. Winston, M. Arora, J. Maselko, V. Gáspár, and K. Showalter, Nature (London) **351**, 132 (1991).
[7] K. J. Lee, E. C. Cox, and R. E. Goldstein, Phys. Rev. Lett. **76**, 1174 (1996).
[8] B. Grenfell, O. Bjørnstad, and J. Kappey, Nature (London) **414**, 716 (2001).
[9] S.-H. Lee, R. Blake, and D. J. Heeger, Nat. Neurosci. **8**, 22 (2005).
[10] G. B. Ermentrout and D. Kleinfeld, Neuron **29**, 33 (2001).
[11] W. Xu, X. Huang, K. Takagaki, and J.-y. Wu, Neuron **55**, 119 (2007).
[12] D. Rubino, K. A. Robbins, and N. G. Hatsopoulos, Nat. Neurosci. **9**, 1549 (2006).
[13] M. Massimini, R. Huber, F. Ferrarelli, S. Hill, and G. Tononi, J. Neurosci. **24**, 6862 (2004).
[14] M. R. Cohen and A. Kohn, Nat. Neurosci. **14**, 811 (2011).
[15] G. B. Ermentrout, R. F. Galán, and N. N. Urban, Trends Neurosci. **31**, 428 (2008).
[16] A. Pikovsky, M. Rosenblum, and J. Kurths, *Synchronization: A Universal Concept in Nonlinear Sciences* (Cambridge University Press, Cambridge, UK, 2001).
[17] J.-n. Teramae and D. Tanaka, Phys. Rev. Lett. **93**, 204103 (2004).
[18] S. Amari, Biol. Cybern. **27**, 77 (1977).
[19] P. C. Bressloff, J. Phys. A: Math. Theor. **45**, 033001 (2012).
[20] A. Hutt, A. Longtin, and L. Schimansky-Geier, Phys. Rev. Lett. **98**, 230601 (2007).
[21] Numerical simulations used the Euler-Maruyama method along with a direct spectral method for evaluating integrals. Time steps $= 0.01$ and spatial steps $= 2\ /1000$. Numerically evaluated Lyapunov exponents were determined by averaging $\ln|\Delta_1( ) - \Delta_2( )|$ across $N = 5000$ realizations and fitting to $A +$ using MATLAB's polyfit function.
[22] B. Ermentrout, Rep. Prog. Phys. **61**, 353 (1998).
[23] Z. P. Kilpatrick and B. Ermentrout, SIAM J. Appl. Dyn. Syst. **12**, 61 (2013).
[24] D. Panja, Phys. Rep. **393**, 87 (2004).
[25] P. C. Bressloff and M. A. Webber, SIAM J. Appl. Dyn. Syst. **11**, 708 (2012).
[26] C. W. Gardiner, *Handbook of Stochastic Methods for Physics, Chemistry, and the Natural Sciences* (Springer, Berlin, 2004).
[27] H. Nakao, K. Arai, and Y. Kawamura, Phys. Rev. Lett. **98**, 184101 (2007).
[280001Tc[(')54Tf.95Tc P77 and. Phys.Rev.E **85**, 021910 (2012).
[29] D. J. Pinto and G. B. Ermentrout, SIAM J. Appl. Math. **62**, 226 (2001).
[30] S. olias Phys. Rev. Lett. **95**, 208107 (2005).