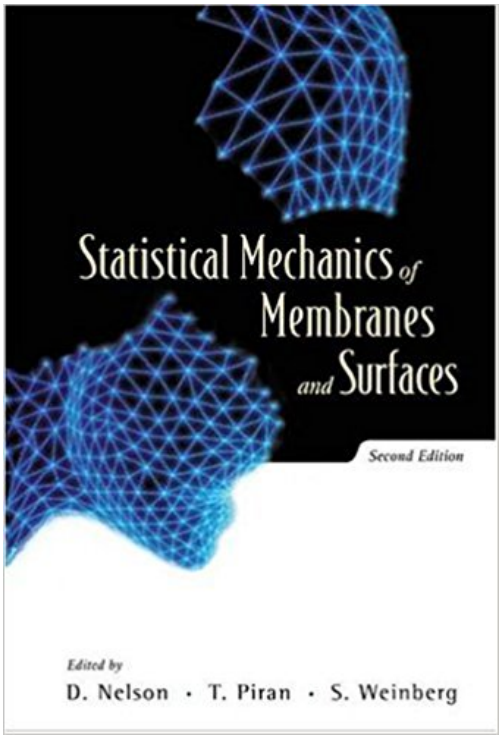
Professor David Robert Nelson



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See:
https://www.physics.harvard.edu/people/facpages/nelson
https://www.seas.harvard.edu/directory/nelson
https://manoharan.seas.harvard.edu/people/david-r-nelson
https://scholar.google.com/citations?user=jGboazkAAAAJ&hl=en
https://en.wikipedia.org/wiki/David_Robert_Nelson
https://www.macfound.org/fellows/209/
https://www.researchgate.net/profile/David_Nelson15
https://scholar.google.com/citations?user=jGboazkAAAAJ&hl=en

Arthur K. Solomon Professor of Biophysics
Department of Physics
Harvard University, Cambridge, Massachusetts, USA

Education:
Nelson graduated from Cornell University Summa cum laude in 1972, with a MS in 1974, and with a Ph.D. in 1975. He was in the fourth and final class of Cornell's short-lived "Six-year Ph.D. program".

Biography:
David Nelson's research focuses on collective effects in the physics and chemistry of condensed matter. He has been interested, in particular, in the interplay between fluctuations, geometry and statistical mechanics. In collaboration with his Harvard colleague, Bertrand I. Halperin, he is responsible for a theory of dislocation-mediated melting in two dimensions. The prediction of Halperin and Nelson of a fourth "hexatic" phase of

matter, interposed between the usual solid and liquid phases, has now been confirmed in experiments on thin films and bulk liquid crystals. Nelson's research includes a theory of the structure and statistical mechanics of metallic glasses and investigations of "tethered surfaces", which are two-dimensional generalizations of linear polymer chains. These fishnet-like structures exhibit a remarkable low temperature flat phase upon cooling. Nelson has also studied the flux line entanglement in the new, high temperature superconductors. At high magnetic fields, thermal fluctuations cause regular arrays of flux lines to melt into a tangled spaghetti state. The physics of this melted flux liquid has important implications for many of the proposed applications of these new materials. His current interests include vortex physics, the statistical mechanics of polymers, topological defects on frozen topographies and biophysics.

Selected Publications:

Books:

D.R. Nelson, Defects and Geometry in Condensed Matter Physics, Cambridge University Press, Cambridge, 2002.

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Paczuski, M., Kardar, M. & Nelson, D. R. Landau theory of the crumpling transition. Phys. Rev. Lett. 60, 2638–2640 (1988).

M. Bowick, A. Cacciuto, D. R. Nelson, A. Travesset, Phys. Rev. Lett. 89, 185502 (2002).

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A. Fernandez-Nieves, V. Vitelli, A. S. Utada, D. R. Link, M. Marquez, D. R. Nelson, and D. A. Weitz, Phys. Rev. Lett. 99, 157801 (2007).

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Jayson Paulose and David Nelson, “Folding and buckling pathways in spherical shells with soft spots”, Bulletin of the American Physical Society, APS March Meeting 2012, Vol. 57, No. 1, Session Q52: Focus Session: Extreme Mechanics – Shells and Snapping, Wednesday, February 29, 2012.

Paulose J, Vliegenthart GA, Gompper G, Nelson D.R., “Fluctuating shells under pressure”, Proc. Natl Acad Sci U.S.A., Vol. 109, No. 48, pp 19551-6, November 2012

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E. H. Yong, D. R. Nelson, and L. Mahadevan. Elastic Platonic Shells. Phys. Rev. Lett., 111(17):177801, Oct. 2013.