
Contribution ID: **40** Type: **Talk**

# High Precision MC/RG Study of Elastic Fluctuations in Solid Membranes

*Wednesday, 16 September 2015 16:30 (25 minutes)*

The computation of the critical exponent eta characterizing the universal elastic behavior of crystalline membranes in the flat phase continues to represent challenges to theorists as well as computer simulators that manifest themselves in a considerable spread of numerical results for eta published in the literature. We provide additional insight into this problem [A.T. PRE 91, 022132 (2015)], that results from combining Wilson's momentum shell renormalization-group method with the power of modern computer simulations based on a recent optimization [A.T. PRB 87, 104112 (2013)] of our Fourier Monte Carlo algorithm. We discuss the ideas and difficulties underlying this combined scheme and present a calculation of the renormalization-group flow of the effective two-dimensional
Young modulus for momentum shells of different thickness. Extrapolation to thick shells allows us to produce results in reasonable agreement with those obtained by functional renormalization group or by Fourier Monte Carlo simulations in combination with finite-size
scaling. Moreover, our method allows us to obtain for the the first time a numerical estimate for the value of the Wegner exponent omega that determines the leading correction to scaling. This in turn allows us to refine our numerical estimate for eta previously obtained from precise finite-size scaling data [2], and also sheds some light on the possible reasons for the dispersion of previously published numerical estimates for eta. In particular, for the solid case, our numerical
estimate for eta is markedly smaller than that derived from other recent simulations, and we find clear evidence against "intrinsic ripples", whose existence has been repeatedly claimed in the
graphene-related literature.

**Primary author:** Dr TRÖSTER, Andreas (Vienna University of Technology, Institute of Material Chemistry, Getreidemarkt 9, A-1060 Wien, Austria)

**Presenter:** Dr TRÖSTER, Andreas (Vienna University of Technology, Institute of Material Chemistry, Getreidemarkt 9, A-1060 Wien, Austria)

**Session Classification:** Two-dimensional systems

**Track Classification:** DyProSo2015 Main track