Statistical Mechanics of a Living Cell

Result:
• Microtubules fluctuate in time
• Effective temperature is \( \sim 300 \, k_B T \)

Question:
• Can statistical mechanics be applied to a complex system such as a living cell?
• Can we use non-equilibrium statistical mechanics to describe complex systems such as a living cell?
• Is this of any value to scientists other than physicists?
G’ vs. Prestress

Result:
• Gels from actin, filamin, gelsolin exhibit same mechanical behavior as live cells.
• Significant increase in elastic modulus upon shear stress

Question:
• What is minimum requirement to mimic behavior of living cell?
• Is this reductionist approach of any value to biology?