

COLLOQUIUM

How simple membranes give insights into the first protocells on earth and 2D critical phenomena.

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4:00 p.m. - Wilson Hall, One West

The physics that occurred in the first three minutes set the stage for life. But where were the actors? How did molecules on the early Earth assemble into storehouses of information (RNA) surrounded by a membrane in order to form the first protocell? Major questions have included how the molecular building blocks of RNA were selected from a mixture of prebiotic compounds, and how early membranes were stabilized against flocculation. Our group recently discovered that building blocks of RNA bind to simple membranes, and that this binding stabilizes the membranes against flocculation. If we fast-forward to the present, we find that cell membranes are composed of more complex molecules: lipids and sterols. These molecules can demix in the 2-dimensional plane of the membrane. As such, membranes present a unique system for accessing 2-D critical phenomena with conserved order parameter. We have conducted the first systematic measurement of the dynamic critical exponent in such a system, and found that our result is consistent with recent theory.

** No prior knowledge of biology, chemistry, or condensed matter is required to enjoy this seminar.**