

PHYSICAL MATHEMATICS SEMINAR

NEMATIC BITS AND LOGIC GATES

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ABSTRACT:

Topological field structures in nematic liquid crystals are known to share phenomenological and mathematical analogies with superconducting quantum mater. While the experimental control of orientation and dynamics of nematic structures has been developed, little is known how such structures could be used for information storage and computation. We introduce nematic bits by using a quaternionic mapping from nematic defects to a Bloch sphere. By using electric fields, we show in theory and simulation how logic gates could be applied to nematic bits, analogous to Pauli, Hadamard and other logic gates. In ensembles of two nematic bits, we show strong and weak correlations, which depend on the choice of the measurement procedure and time scales involved. We also show a two nematic bit analogue to the Deutsch algorithm, exploring a pathway towards non-classical computational strategies in topological soft matter systems.

TUESDAY, APRIL 6, 2021

2:30 PM – 3:30 PM

<https://math.mit.edu/sites/pms/>

<https://mit.zoom.us/j/95597721876>

Meeting ID: 955 9772 1876