Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Helices Of Helices MAHSA SIAVASHPOURI, MARK ZAKHARY, Brandeis Univ, CHRISTIAN WACHAUF, HENDRIK DIETZ, Technische Universitat Munchen, ZVONIMIR DOGIC, Brandeis University — Twisted ribbons are characteristic structural motifs that are prevalent in nature. However correlation between the macroscopic properties of the final self-assemblages and the microscopic features of the constituent molecules remain unknown. We describe a new class of supramolecular 1D assemblages with tunable mechanical properties. Using DNA origami technique, we design and structure rod-like colloidal particles that have excluded volume interactions and self-assemble into twisted ribbons in presence of attractive interactions mediated by non-absorbing polymers. By comparing behavior of DNA origami filaments and rodlike viruses we demonstrate that self-assembly into 1D twisted ribbons is universal and independent of the system materials. Tuning the molecular properties of the DNA origami particles, determines the physical properties of the entire self-assembled structures. Furthermore, to understand the connection between the chirality at the molecular scale and the macroscopic chiral structures, we measured twist periodicity (pitch) of cholesteric phase associated to various DNA origami designs which can develop a new framework in understanding microscopic origin of chirality in liquid crystals.

Mahsa Siavashpouri
Brandeis Univ

Date submitted: 06 Nov 2015 Electronic form version 1.4