MAS17-2017-000130

Abstract for an Invited Paper
for the MAS17 Meeting of
the American Physical Society

The most optically active triangle?[1]

BART KAHR, New York University

Scientists intuitively believe that some things are more chiral than others; the molecule CHFDT seems 'less chiral' than CHFClBr and the latter is likely more optically active in solution. Observations of this kind have long inspired chemists to try to correlate pseudoscalar properties with measures of chirality associated with models of molecules. But, we can do no better than inventing chirality functions for geometric figures, foregoing correlations with properties. Much thinking has gone into the development of chirality functions for triangles in 2D (Buda, auf de Heyde, Mislow. 1992). However, it was recognized that there are innumerable chirality functions and none are privileged. Every triangle is 'the most chiral triangle' by some measure (Rassat, Fowler, 2003) We turned the question inside out by seeking out the most optically active triangle, then expected to seek the chirality function best adapted to the answer. We simulated the Mueller matrix by propagating basis polarization states through nanoscopic, thin gold triangular prisms of equal volume, with triangular faces of 700 square nm, and bases varying from 400 to 1000 nm. The extrema are isosceles. The polarimetric responses of such objects are complex and belie simply interpretations in terms of geometry.

[1]National Science Foundation