Erice, September 2022

HELICITY OF SEIFERT FRAMED DEFECTS

DE WITT SUMNERS

Department of Mathematics, Florida State University, USA
E-mail: sumners@math.fsu.edu

ABSTRACT

The topology and helicity of anti-parallel defect reconnection will be discussed. Line defects are one-dimensional phase singularities (forming knots and links) that arise in a variety of physical systems. In these systems, isophase surfaces (Seifert surfaces) have the phase defects as boundary, and these Seifert surfaces define a framing of the normal bundle of each link component. We define the individual helicity for each component of a link singularity, and prove that each individual helicity is zero if and only if there exists a Seifert framing for the link. We extend these results to multi-armed defects. We prove that under anti-parallel reconnection of framed defect strands that both twist and writhe helicity are conserved.

Co-authors: Christian E. Laing, Renzo L. Ricca, Irma Cruz-White

[1] Laing, C.E. Ricca, R.L. Sumners, D.W. 2015 Conservation of writhe helicity under anti-parallel reconnection, *Nature Scientific Reports* **5**, 9224.
[2] Sumners, D.W., Cruz-White, I. Ricca, R.L. 2021 Zero Helicity of Seifert Framed Defects, *J. Phys A, Math. Theor.* **54**, 295203.