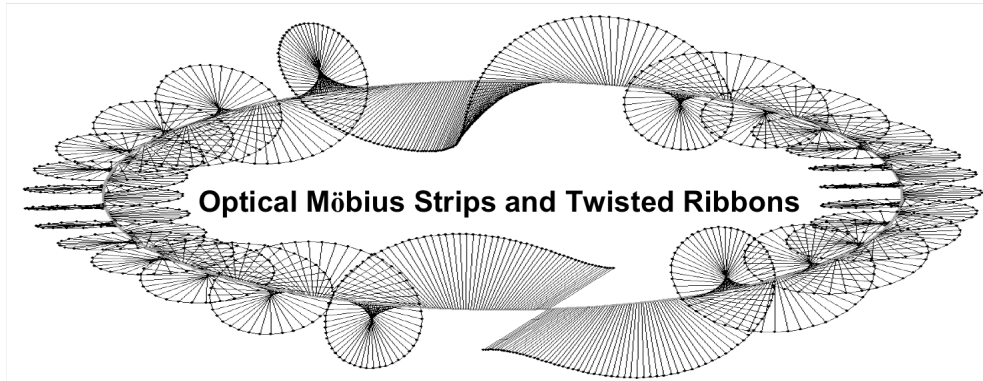


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Isaac Freund

## Lecture I: Optical Moebius Strips and Twisted Ribbons (Part I).

Part I will include a brief review of the canonical polarization singularities of three dimensional (3D) elliptically polarized optical fields: C lines and C points, L lines and L points. A useful summary of these singularities, that were introduced by J. F. Nye (Bristol), is given in his book: *Natural Focusing and Fine Structure of Light* (IOP Publishing, Bristol, 1999). A new, nonconventional class of singularities will be described that play an essential role in some, but not all, sign inversions of Nye's classical singularities. The 3D structure of the twisted ribbons and cones that surround ordinary (i.e. non-singular) points in a 3D field of polarization ellipses will be described, and the multitude of topological and geometrical indices that characterize these structures will be discussed.

## Lecture II: Optical Moebius Strips and Twisted Ribbons (Part II).

Part II will continue with a discussion of the 3D structure of the Möbius strips and cones that surround C points, the twisted ribbons, cones, and rings, that surround L points, and the topological and geometrical indices that characterize these structures. Simple, easily applied methods will be described for generating Möbius strips with arbitrarily large odd numbers of half-twists, and twisted ribbons with arbitrarily large even numbers of half-twists. An example of a Möbius strip with 49 half-twists is illustrated above. The ascending/descending multi-step quantized staircases that describe the topological and geometrical indices that characterize these multi-twist structures, the sign inversions that occur as a staircase is traversed, and the role of the nonconventional singularities in these sign inversions, will be discussed. A brief discussion, including detailed numerical estimates, will be given of experimental methods that could permit measurements to be made of the numerous unusual structures described here theoretically.