Polarization fingerprints in the clear blue sky

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Abstract:

Daylight is polarized, the strength being greatest at points in the sky at right angles to the sun, and zero at four points: above and below the sun and anti-sun. The zero-polarization points are 'fingerprint' singularities, around which the polarization direction makes a half-turn. Using elementary singularity theory, the polarization pattern across the whole sky can be described in a way that fits recent observations with an accuracy comparable to that of conventional elaborate multiple-scattering calculations. This recent work is a contribution to a story that started in 1817 and has been central to our understanding of polarized light.