Circular spectropolarimetric sensing of homochirality
a unique and unambiguous biosignature

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Decaying leaves

- Intact leaves show a strong decrease in signal over time
- Faster decrease in polarization than decrease in chlorophyll a concentrations: breakdown of the supramolecular structure
- Allows to distinguish between healthy and stressed vegetation

Spatial polarizing features

- The induced polarization by vegetation is the superposition of a negative and a positive band resulting from different chiral domains
- The polarization by chloroplasts is spatially anisotropic
- In leaf veins, there is a preferred orientation resulting in a negative signal only rather than the typical split signal

Observations in the field

- Vegetable biosignatures are readily distinguishable from abiotic matter

TreePol

- Rapid modulation by Ferro-electric Liquid Crystals
- Simultaneous recording of orthogonal polarization states in beam exchange through combination with dual fast line-detectors
- Crosstalk mitigation through 90 degrees rotatable outer cage and fast spinning half waveplate in front of the instrument

Interspecific differences

- Different species express a different complexity in their chloroplast supramolecular assembly, leading to distinguishable signals of different strength
- These more delicate signals allows better insight into the structural composition and transformation