

Jarosław Dyks, Zjazd CAMK 2025/26

Publications:

Cao, Shunshun; Jiang, Jinchun; Dyks, J.; Lee Keija; Lu, Jiguang; et al. 2025, Rapid rotation of polarization orientations in PSR B1919+21's single pulses: implications on pulsars's magnetospheric dynamics, ApJ, 983, 43

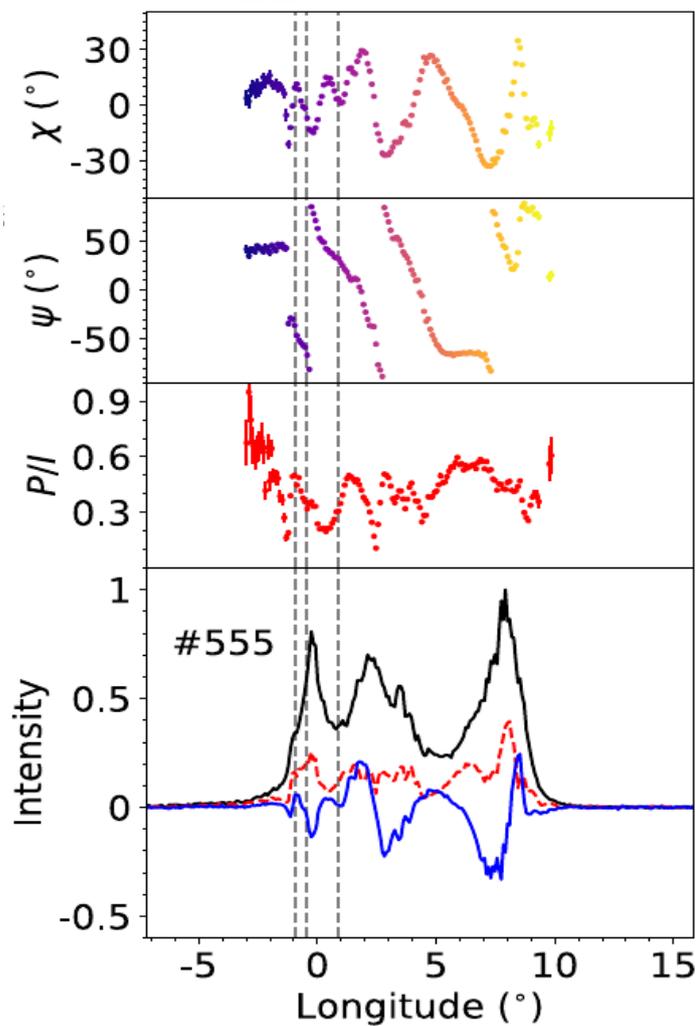
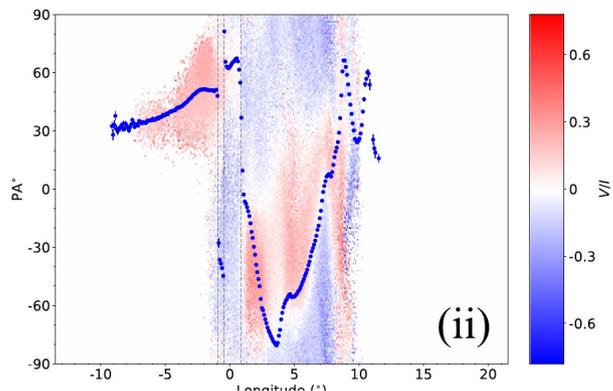
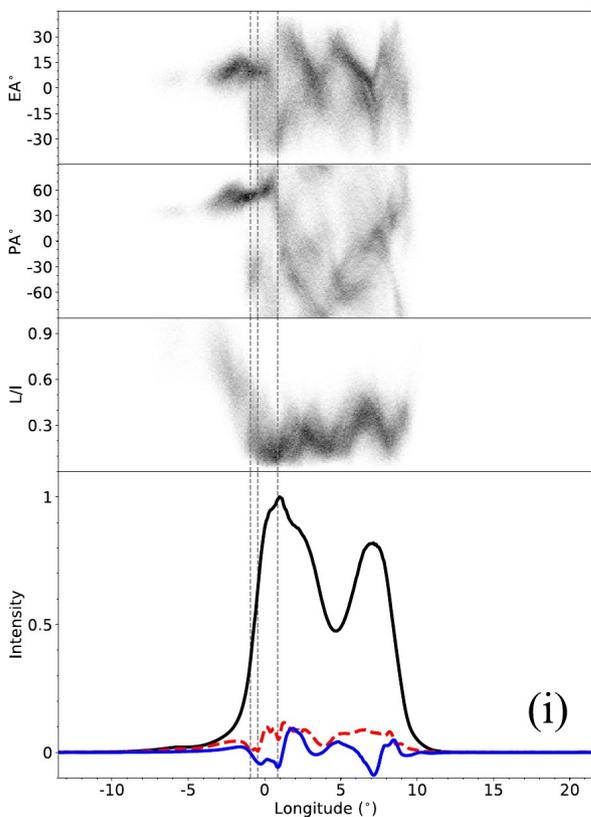
Roy, Tridib; Surnis, Mayuresh; Dyks, J., 2025, Plasma-astrophysical mechanism as a probe to unravel the nature of polarized pulsar radio emission, ApJ, 994, 189

Submitted:

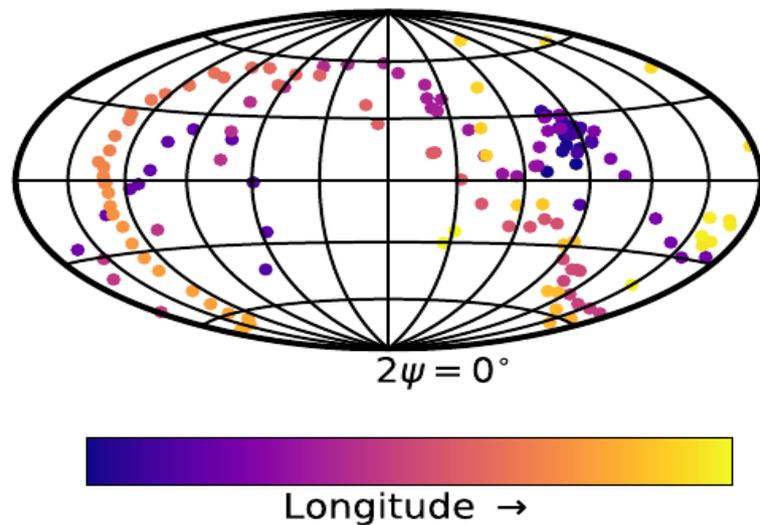
Dyks, J., Saha, L., Frankowski, A., Orthogonal polarization modes of nonbirefringent origin in a geometric radio pulsar signal model, MNRAS

Piyush Marmat – PhD student at SGMK – working on radio pulsar polarization

Complex polarization behaviour of Jocelyn Bell's pulsar PSR B1919+21 resolved by FAST



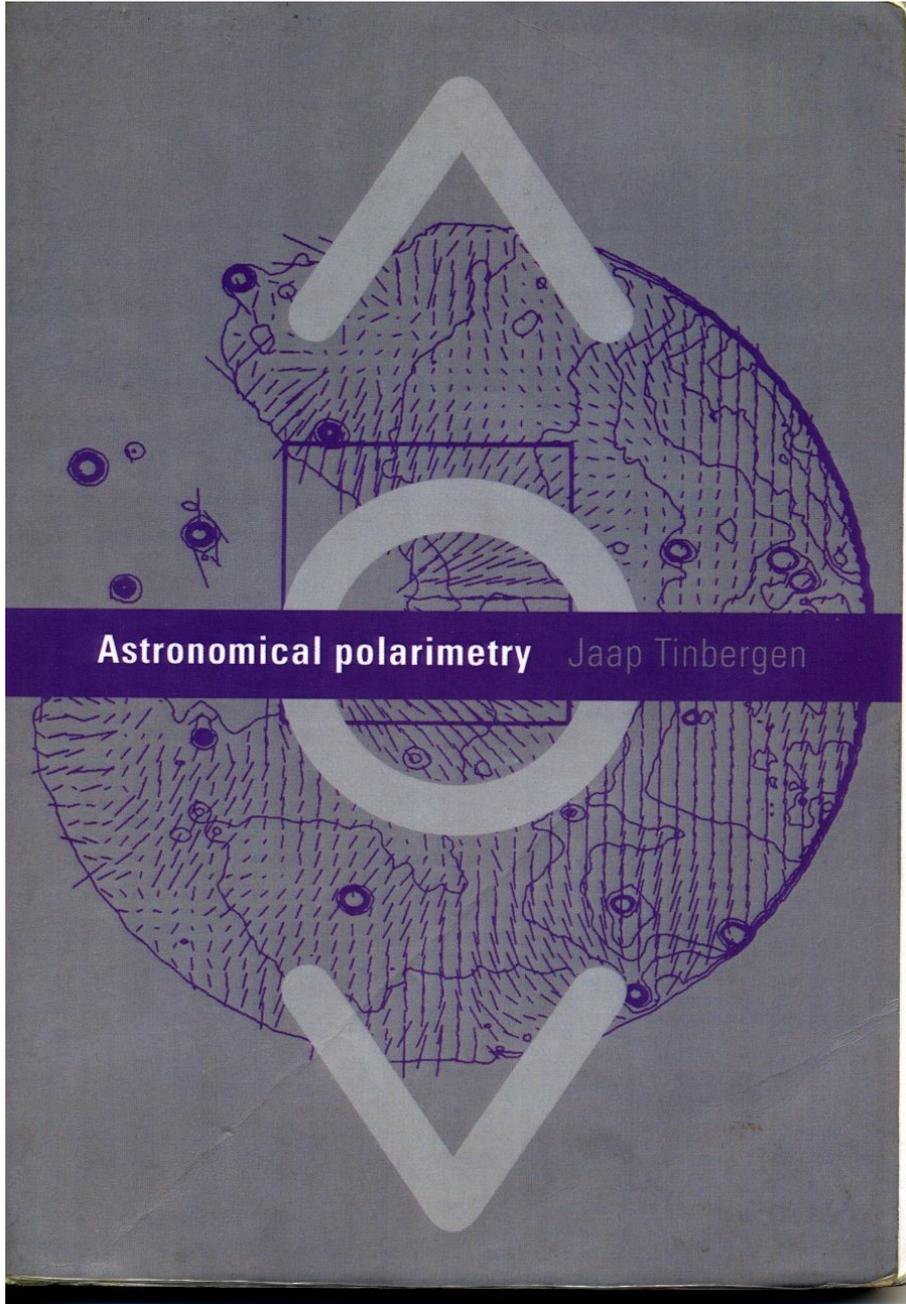
Data for one single pulse



Cao et al. 2025
(FAST)

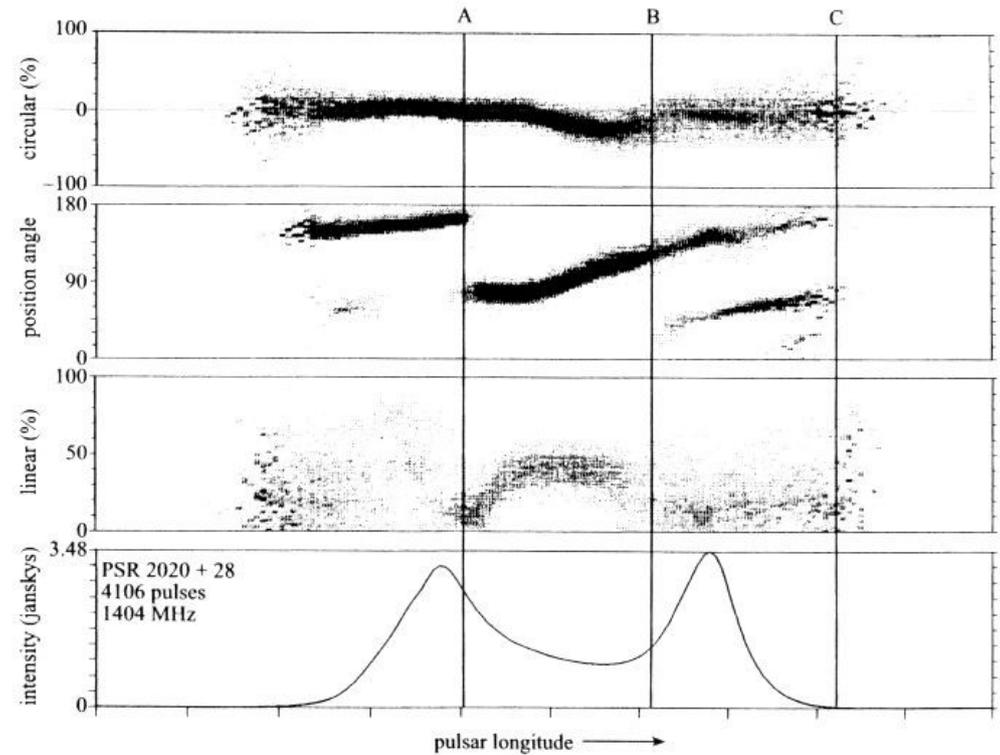
Dyks, J., Saha, L., Frankowski, A., **Orthogonal polarization modes of nonbirefringent origin** in a geometric radio pulsar signal model, MNRAS

Pulsar polarization modes are classical example of birefringence in polarimetry textbooks:



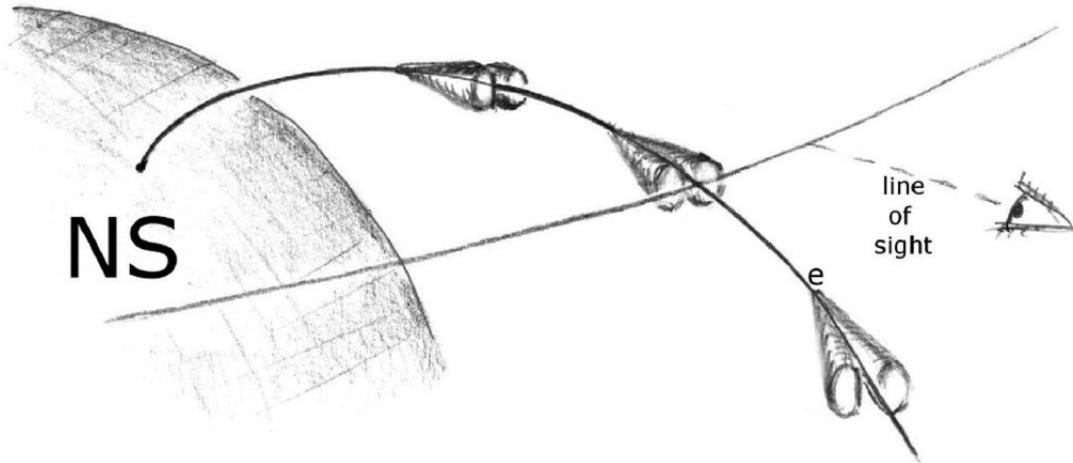
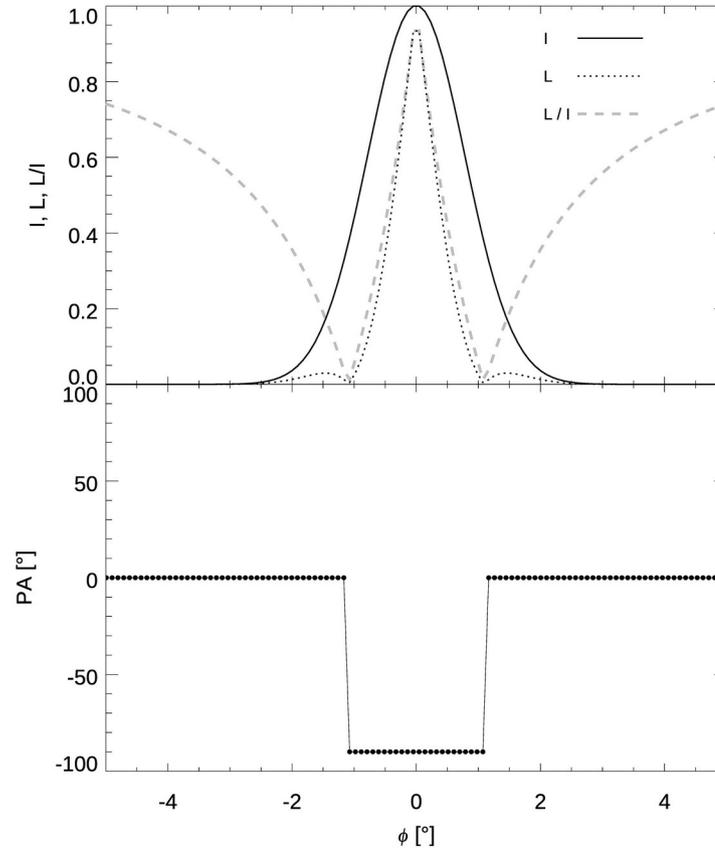
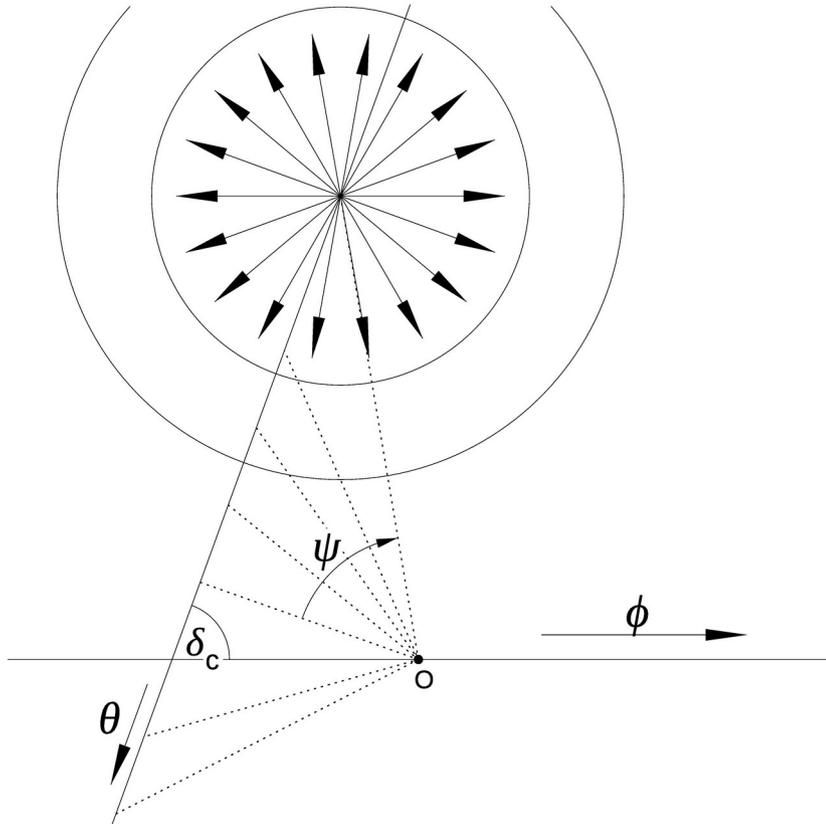
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Polarization in astronomy



Scientific suicide?

A miracle of 2015: single mode used (only radial arrows) but OPM jumps occur for **incoherent** radiative contributions



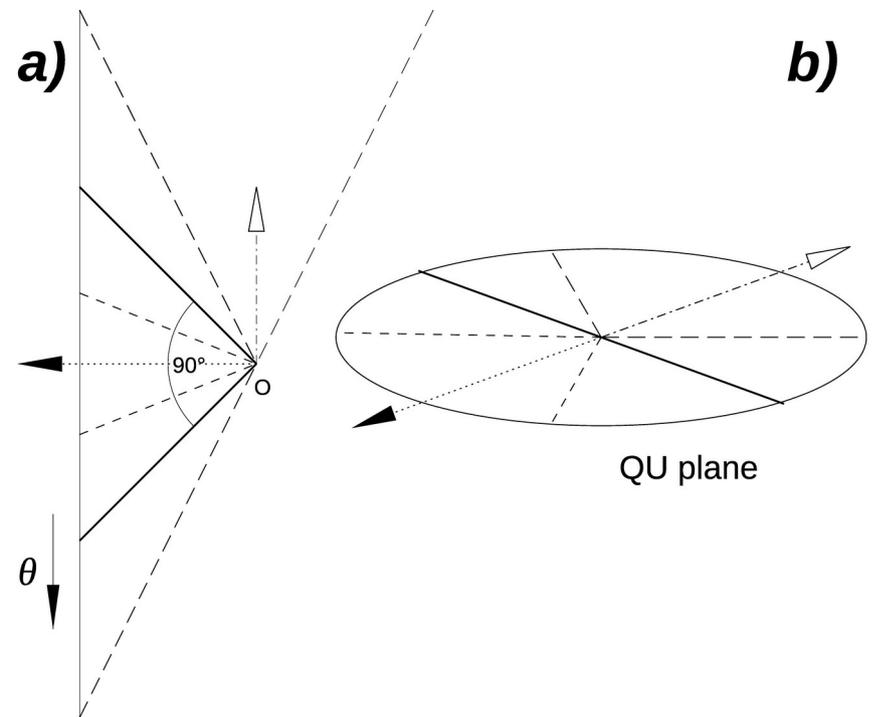
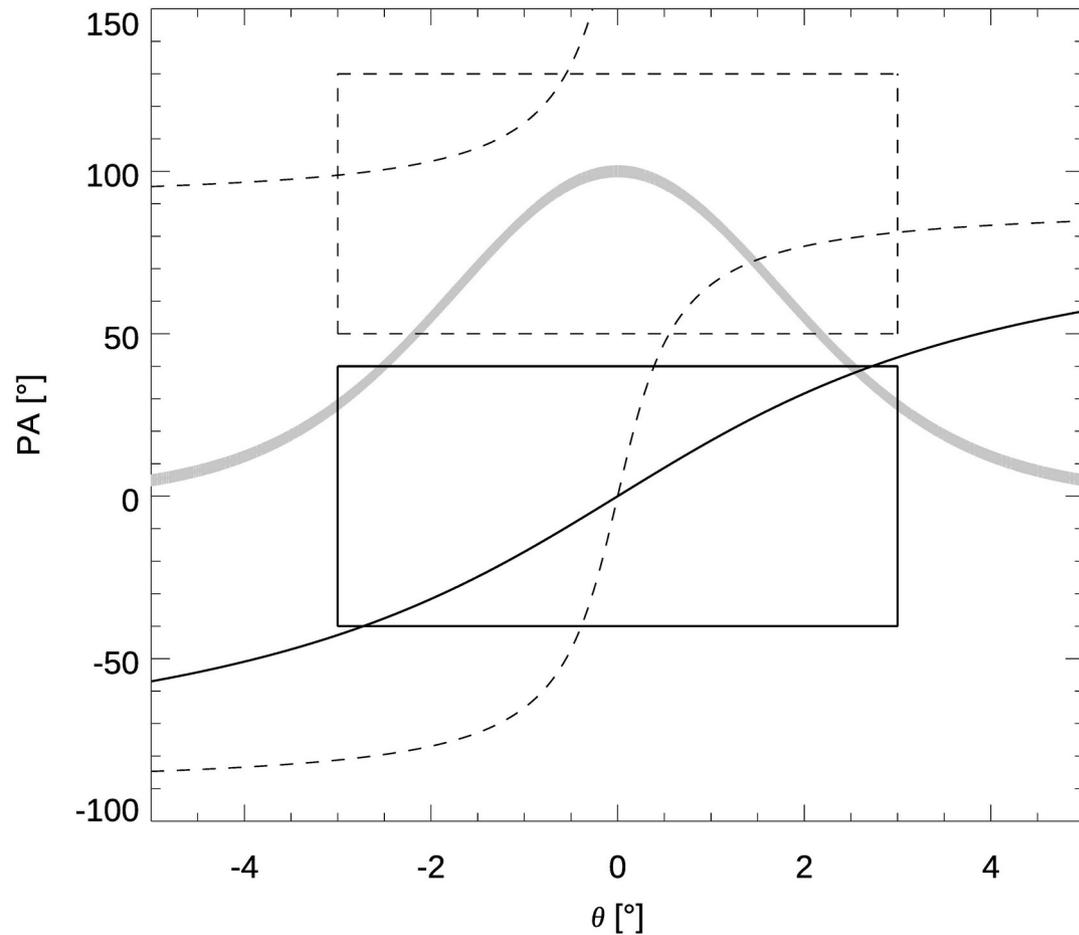
Calculated by Lab Saha -
a postdoc in CAMK in 2015

How possible?

Ease to get geometrically.

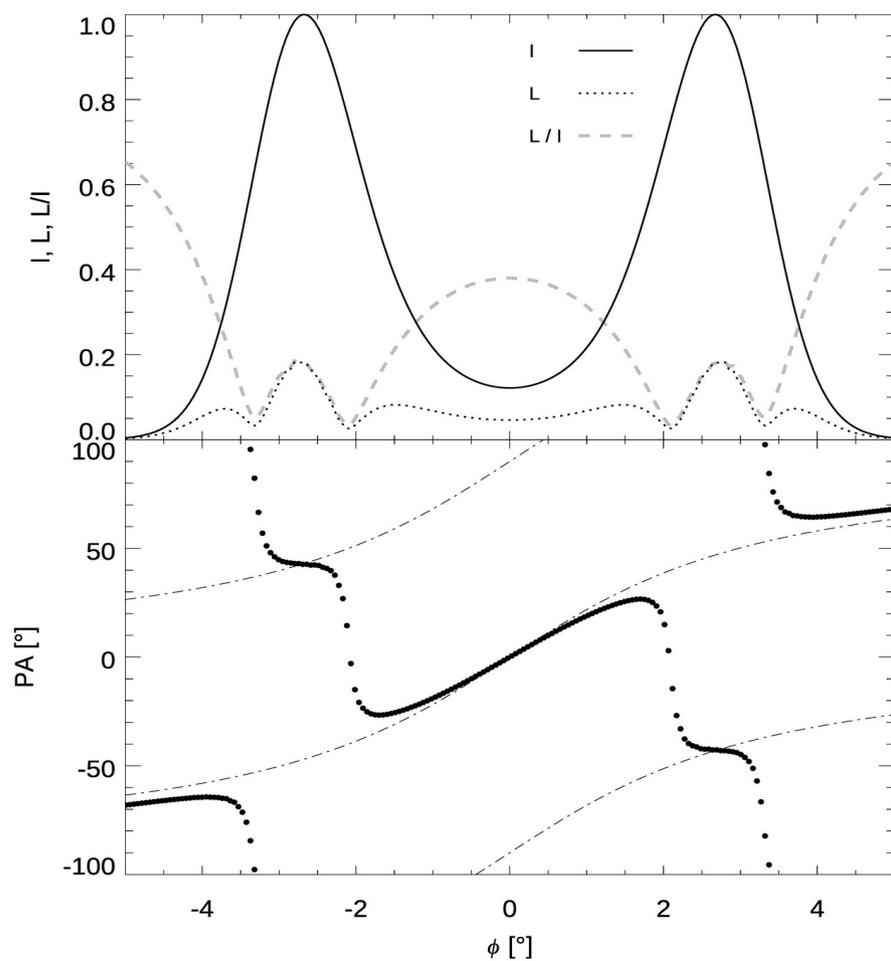
Difficult to tie down to microphysics (hence paper's title: "in a geometric model")

Still, according to reviewer: the paper "nicely presents an effect that may explain observed polarization characteristic of pulsars"

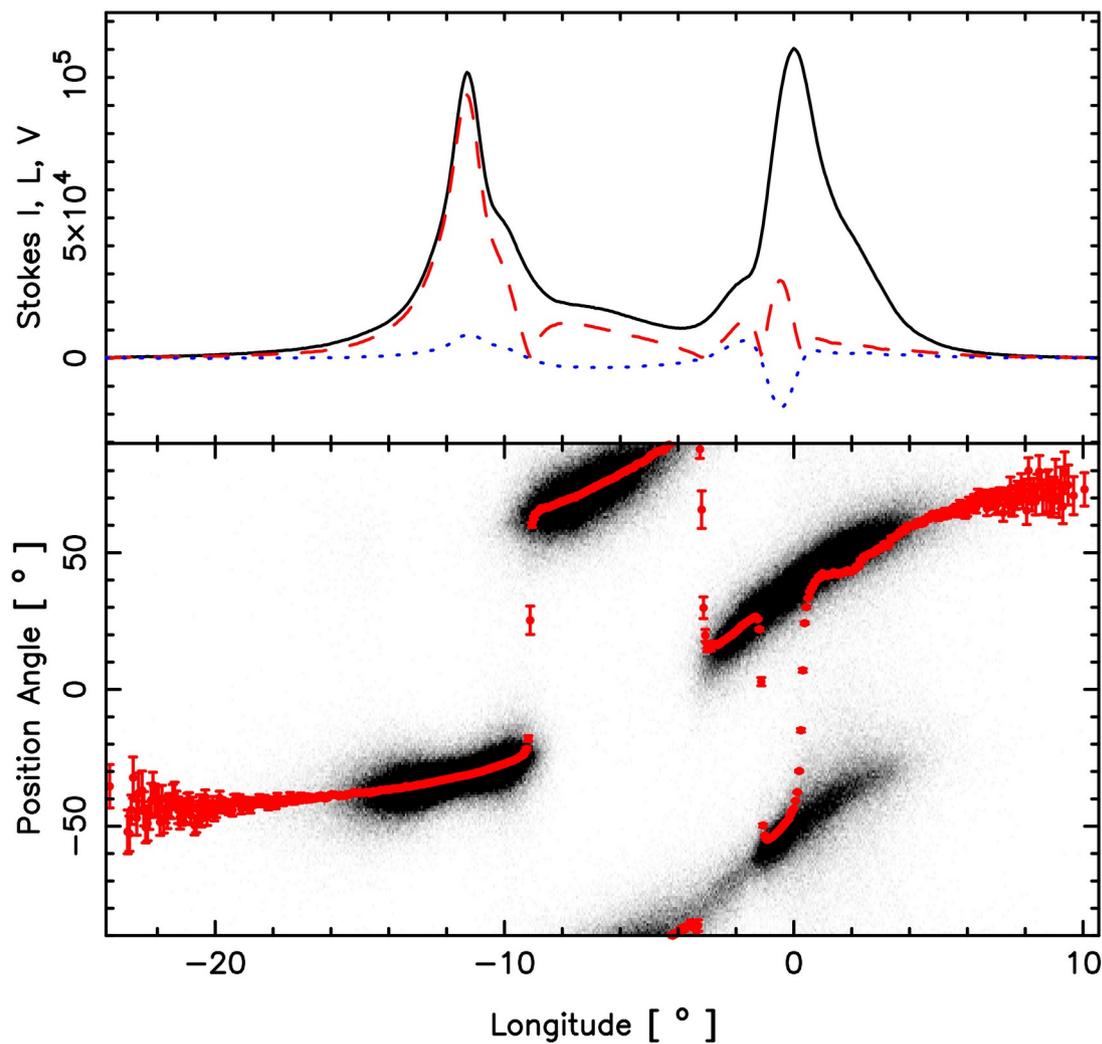


pol. angle averaging under symmetric conditions of beamlet passage

Some early applications look promising:



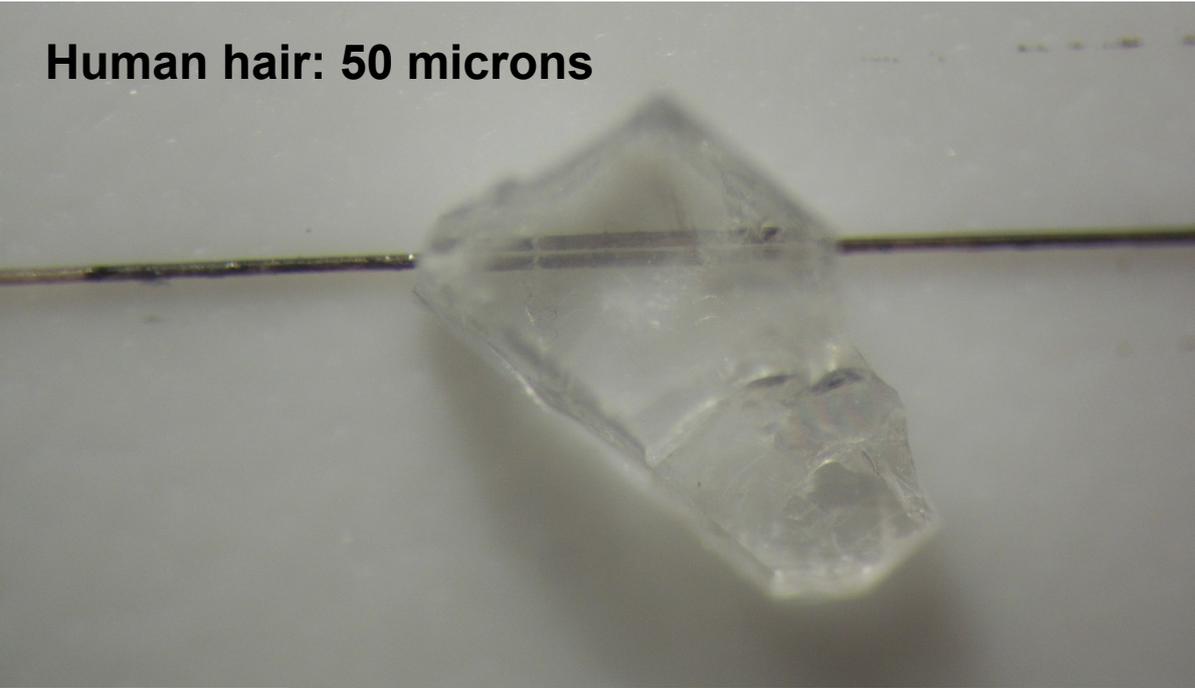
B2020+28 Arecibo 337.67 MHz 0.343 s RM: $-74.590 \text{ rad m}^{-2}$



(if you look at the promising half of the profile)

Birefringence in Ordovician calcite crystal. Crystal thickness: 0.8 mm.

Human hair: 50 microns



Nylon pantyhose fiber: 15 microns



THANK YOU!



**Nylon fiber
with millimeter scale**