

PWNnumpol

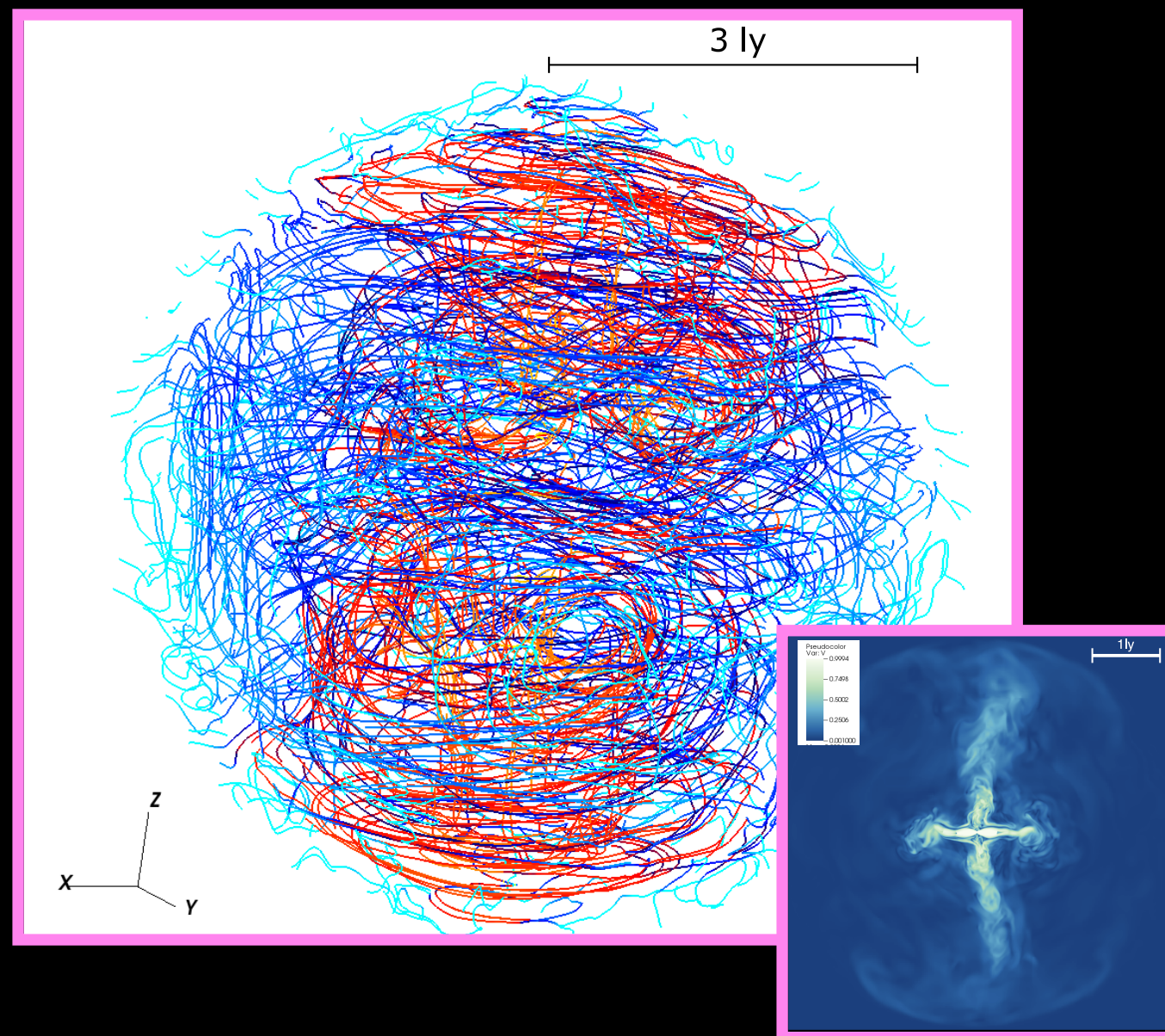
P.I. Niccolò Bucciantini

Co.I. Barbara Olmi, Rino Bandiera, Luca Del Zanna

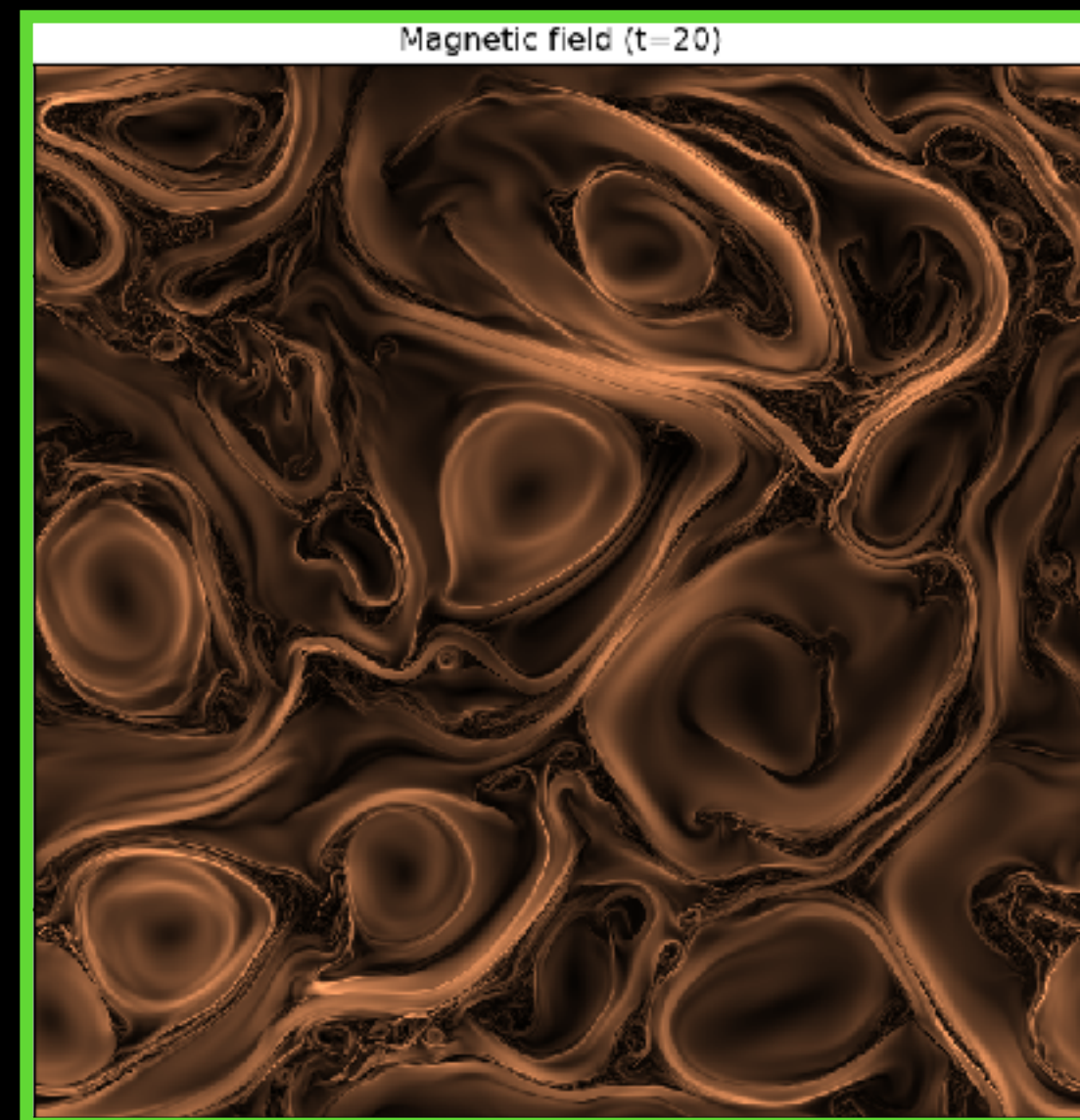
Numerical Studies of Pulsar Wind Nebulae in The Light of IXPE

Summary of work done for the modelling of Emission in PWNe including unresolved Turbulence

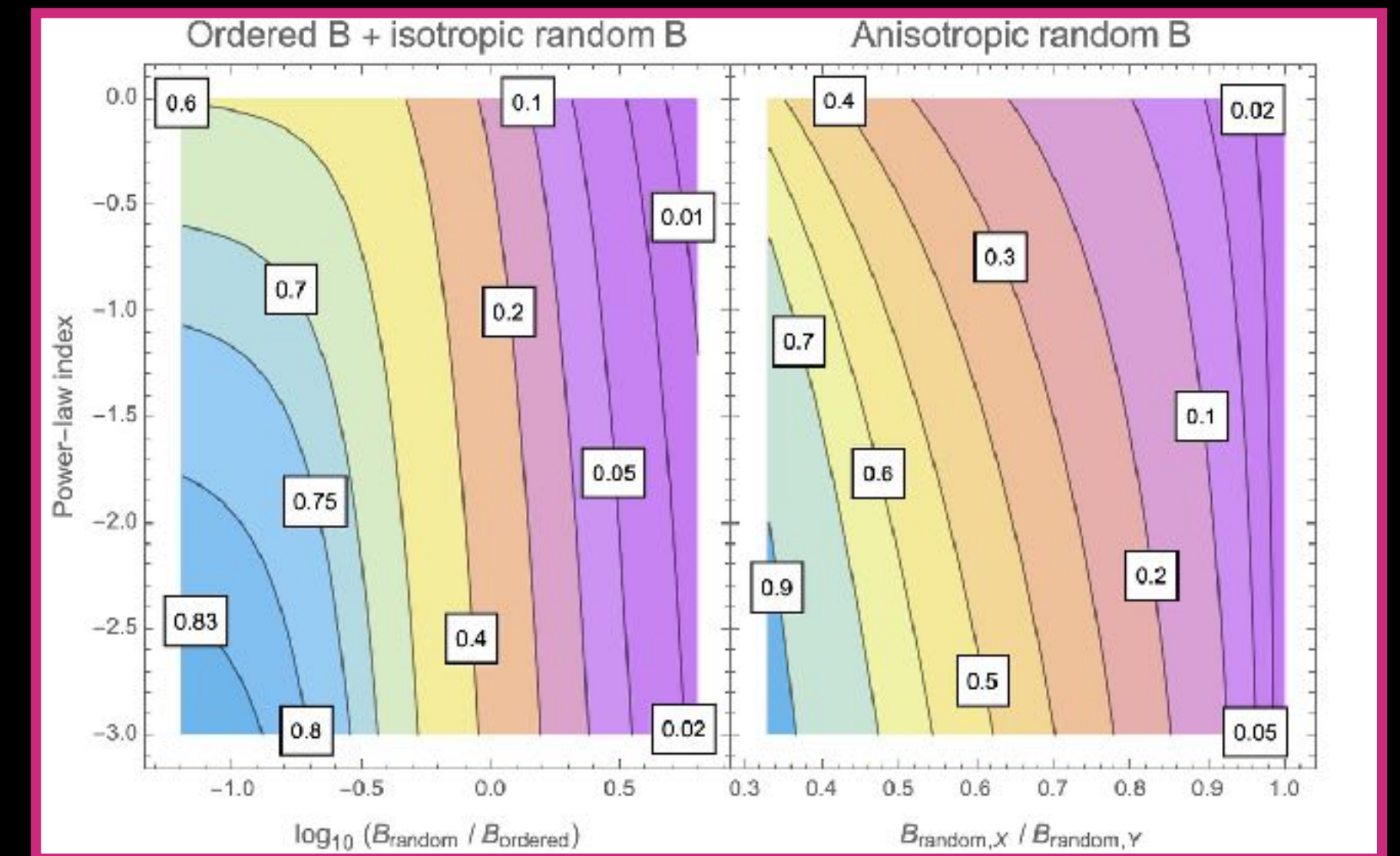
Preliminary study for the development of Models of Magnetic Structure / Turbulence / Polarisation to be used in Predictions of Polarisation Properties and IXPE Modelling



3D RMHD Simulations of Magnetic Field Structure in PWN (Olmi)



3D RMHD Simulations of Relativist Turbulence (Del Zanna)

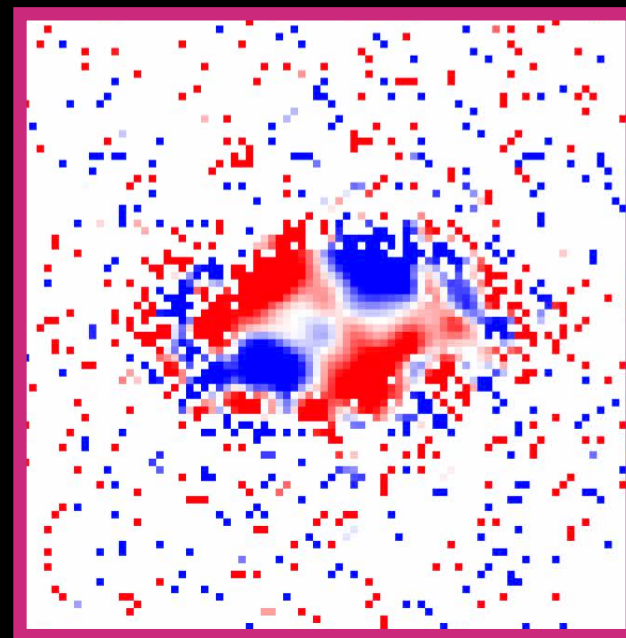
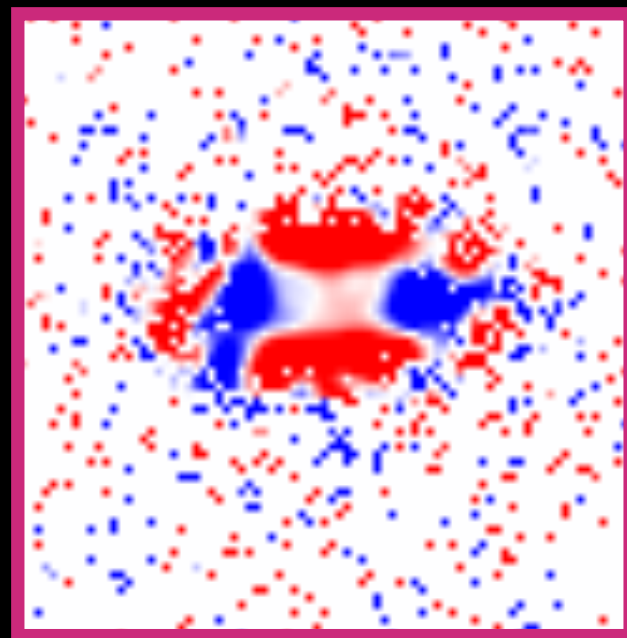


Analytic & Semi-Analytic prescription for sub-scale pol-deg in turbulence (Bandiera)

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Work done for the modelling of IXPE response for extended sources & PWNe

Preliminary modelling of IXPE data - Polarisation Leakage



Crab Nebula

Study and modelling of the polarisation leakage effect. Development of the leakage theory. Development of semi-analytical tools to compute it in extended sources. Application to the Polarisation Measures in the Crab

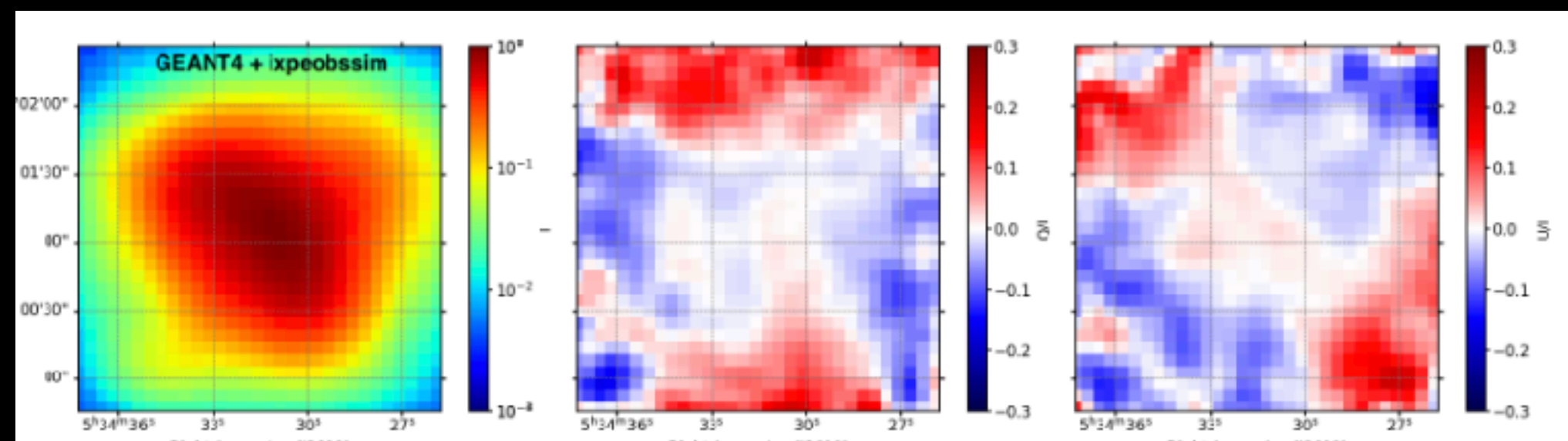
A&A 672, A66 (2023)
<https://doi.org/10.1051/0004-6361/202245744>
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Astronomy
& Astrophysics

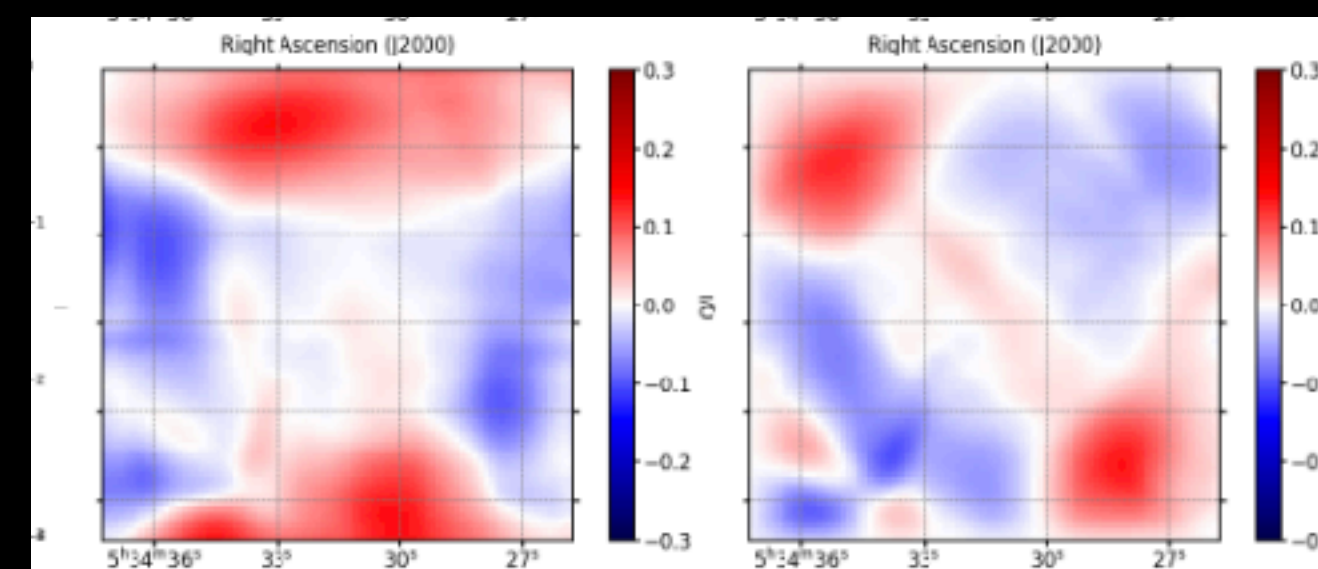
Polarisation leakage due to errors in track reconstruction in gas pixel detectors

N. Bucciantini^{1,2,3}, N. Di Lalla⁴, R. W. R. Romani⁴, S. Silvestri^{5,6}, M. Negro^{7,8,9}, L. Baldini^{5,6}, A. F. Tennant¹⁰, and A. Manfreda⁵

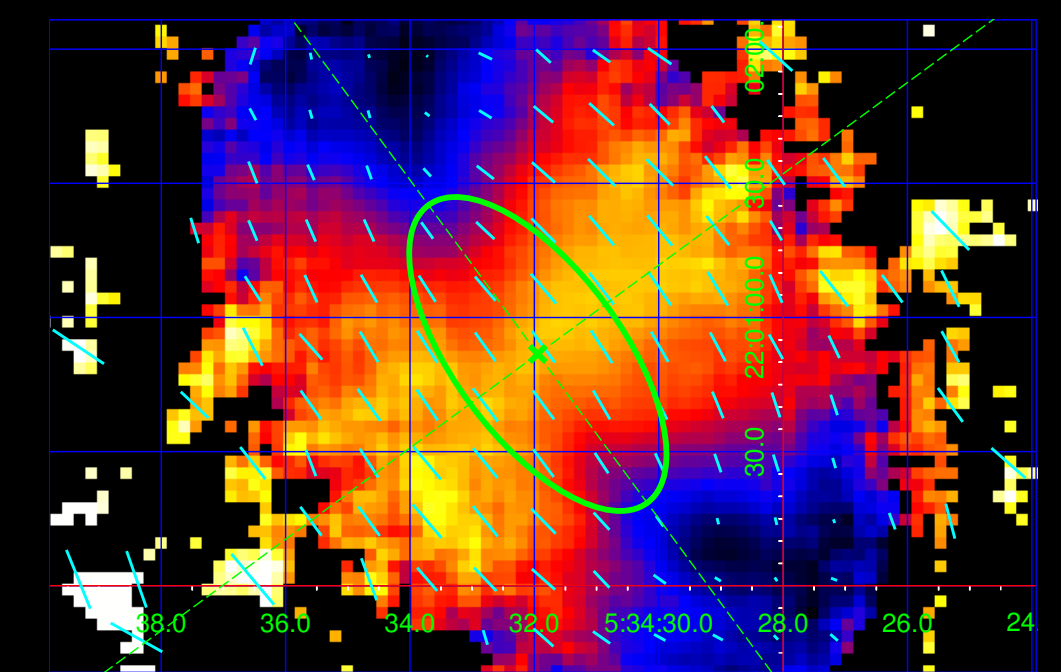
Leakage computed with GEANT4 Montecarlo



Leakage computed with analytical theory



Simulated IXPE polarisation map



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Papers Published & Submitted Relevant to the Project

Bucciantini, N., et al. “Polarisation leakage due to errors in track reconstruction in gas pixel detectors”, *Astronomy and Astrophysics*, vol. 672, 2023. doi:10.1051/0004-6361/202245744

Bucciantini, N., et al. “Simultaneous space and phase resolved X-ray polarimetry of the Crab pulsar and nebula”, *Nature Astronomy*, vol. 7, pp. 602–610, 2023. doi:10.1038/s41550-023-01936-8.

Romani, R. W., et al. “The Polarized Cosmic Hand: IXPE Observations of PSR B1509-58/MSH 15-52”, *The Astrophysical Journal*, vol. 957, no. 1, 2023. doi:10.3847/1538-4357/acfa02.

Mizuno, T., et al “Magnetic Field Structure of the Crab Pulsar Wind Nebula Revealed with IXPE”, *Publications of the Astronomical Society of Japan*, 2023; psad070, <https://doi.org/10.1093/pasj/psad070>

Kuan, L. et al “A Spatially resolved X-ray Polarization map of the Vela Pulsar Wind Nebula”, Submitted to *ApJ*