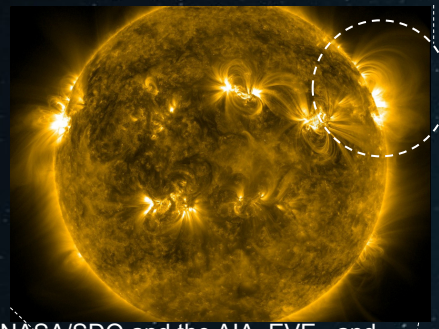
SEEING THE INVISIBLE

Charged particles emit *light* as they spiral along the magnetic fields of the Sun and the Earth. Seeing the light allows us to trace the otherwise invisible magnetic fields!

Magnetic arches towering over the active solar surface



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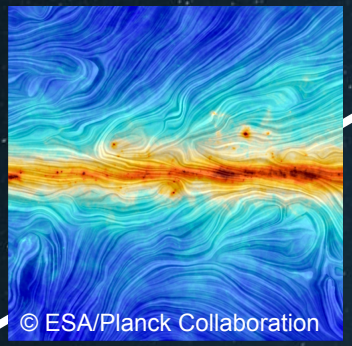
The direction of the polarised light emitted by *dust* tells us the magnetic field orientation.



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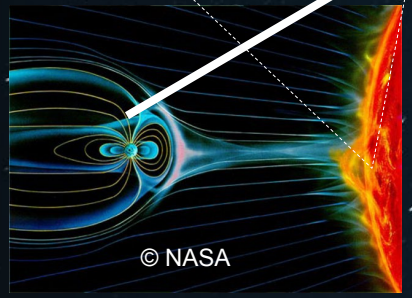
Magnetic fingerprint of our Galaxy – the Milky Way



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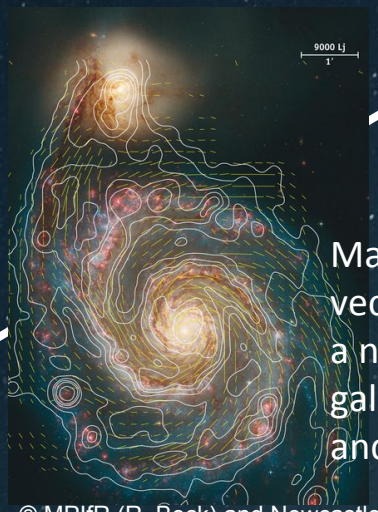
The solar wind carries with it the Sun's magnetic field that interacts with the Earth's magnetosphere (in blue).

On *larger* scales, we use *radio* observations to trace the magnetic fields.

larger structure

weaker field



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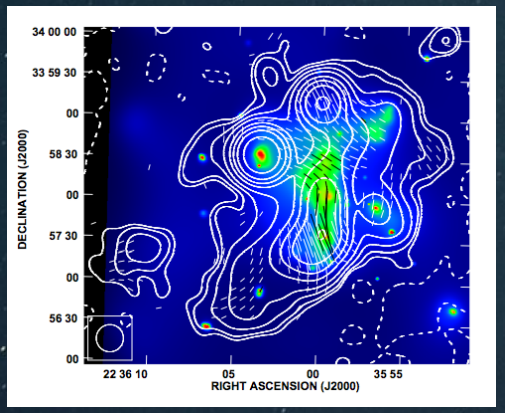
Magnetic field vectors of a nearby galaxy – M51, and a galaxy group – Stephan's Quintet



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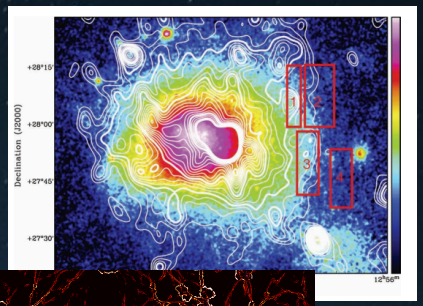
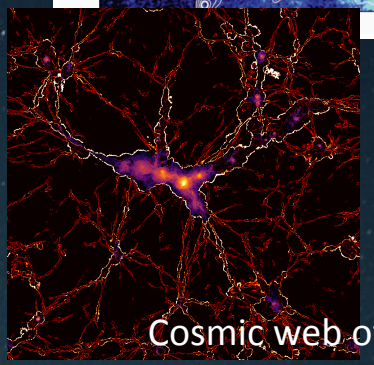
Coma cluster © Brown+ (2011)





Cosmic web of filaments and voids

© TNG Collaboration

How do we correctly infer the magnetic field properties in galaxy clusters and beyond?

Background credit: Just the night sky by Stefan Cosma

TAKE-HOME MESSAGES

- Density fluctuations can mask the effect of magnetic field fluctuations, affecting the correlation length of magnetic fields inferred from the conventional RMF analyses.
- We caution against interpretations of RMF analyses in lognormal-distributed and fractal-like density structures.
- The spatial correlations are generally not the same along the line-of-sight and across the sky plane.
- In complex situations, a covariant polarised radiative transfer calculation is essential to properly track all radiative and transport processes, otherwise the interpretations of magnetism in galaxy clusters and larger scale cosmological structures would be ambiguous.

ABOUT THE AUTHOR

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On+ (2019)

Chan+ (2018)