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First X-ray polarimetry measurements of supernova remnants with IXPE

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Young supernova remnants (SNRs) such as Cas A, Tycho, and SN1006 are relativistic particle accelerators and likely the sources of most of Galactic cosmic rays.

The X-ray synchrotron emission from their shock fronts has been expected to be polarized for some time.

The measurement of X-ray polarization degree and direction provides unique constraints on the turbulence level of the magnetic field, which plays a crucial role in theories of diffusive shock acceleration with efficient magnetic field amplification in supernova remnants, and on the morphology of the magnetic field where particles are accelerated.

The NASA/ASI Imaging X-ray Polarimetry Explorer (IXPE), that launched in December 2021, is the first mission entirely dedicated to X-ray polarimetry.

Its imaging-capable detectors allow us to perform spatially resolved X-ray polarimetry of extended sources such as supernova remnants.

Here I present the first results obtained from the IXPE observation of the SNRs Cas A, Tycho, and SN1006.

Collaboration

on behalf of the IXPE SNR TWG and IXPE Science Team

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