Title : Mapping the magnetic field structure in the Rosette nebula with Planck

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Abstract :
Planck has mapped the dust polarized emission over the whole sky, making it possible to trace the Galactic magnetic field structure that pervades the interstellar medium. We combine polarization data from Planck with rotation measure observations towards a star forming region, the Rosette nebula in the Monoceros molecular cloud, to study its magnetic field structure and the impact of an expanding HII region on the morphology of the field. The Planck observations show that the magnetic field in the nebula has been modified by the stellar feedback when compared to the coherent orientation of the field in the parent molecular cloud. The change in the magnetic field structure is accompanied by low values of polarization degree in the nebula. We model the magnetic field in a uniform shell of swept-up matter and find that the observed field structure and polarization degree can be reproduced if the field is on average oriented 20 degrees from the line of sight. By combining Planck polarization observations with rotation measure data we estimate the amplitude of the magnetic field in the ionized gas of about 5 uG, similar to the typical field strength in the diffuse interstellar medium. We also find that the data are consistent with a field amplification factor of about 3-4 in the dust shell. Higher resolution observations are required to assess the importance of turbulence in the origin of the low polarization degree regions observed, especially in the interaction region between the nebula and the molecular cloud.