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The magnetic field in photodissociation regions

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Photodissociation regions (PDRs) are found in massive star forming sites at the interface between the HII region and the molecular cloud from which the stars formed. Magnetic fields could play an important role in the evolution of PDRs (e.g., Abel et al. 2004, Pellegrini et al. 2007), however this possibility has been the subject of very few studies due to the paucity of relevant data. The recent survey of dust polarized emission by *Planck* can, for the first time, reveal the magnetic field structure in the PDRs closest to the Sun (e.g., in Ophiucus). I will show and discuss some examples, where the magnetic field is observed to have different orientations relative to the ionization front. In addition, I will present an analytical model that describes the magnetic field structure in a PDR formed around an expanding HII region and its application to the Rosette Nebula (Planck Collaboration Int. XXXIV. 2015). We find that, due to the compression of the field lines by the expansion of the ionized gas, there is a local increase of magnetic pressure in the PDR. This could contribute to the confinement of gas at high thermal pressure in PDRs, whose presence is also evidenced by highly excited molecular lines with Herschel (Goicoechea et al. 2011, Joblin et al. in prep.).

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