

Observations of the magneto-ionic interstellar medium with LOFAR

A. Bracco¹

¹ Laboratoire de Physique de l'École Normale Supérieure, ENS, Université PSL, CNRS, Sorbonne Université, Université de Paris, 24 Rue Lhomond, 75005 Paris, France

Radio observations are a unique window to explore the mystery of cosmic magnetism, from the Galaxy to cosmological ages. By tracing synchrotron emission below 200 MHz with unprecedented sensitivity, the LOFAR telescope is providing us with the most detailed image of the magnetized Milky Way that we have just started to explore. In this talk I will present the progress on the analysis of LOFAR data of diffuse Galactic polarization, focussing on what we are learning about the radio sky seen at low frequency. I will highlight first statistical results on the complex coupling between the multiphase interstellar gas, cosmic rays, and the magnetic field in our Galaxy. These observations and their interpretation based on numerical models of the turbulent, multiphase, and magnetized Galaxy are preparing the ground for next-generation radio-telescopes such as NenuFAR, LOFAR2.0, and the Square Kilometer Array.