[구IM-15] Faraday Rotation Measure in the Large Scale Structure III

Takuya Akahori, Dongsu Ryu
Chungnam National University

The nature and origin of the intergalactic magnetic field (IGMF) are an outstanding problem of cosmology, yet they are not well understood. Measuring Faraday rotation (RM) is one of a few promising methods to explore the IGMF. We have theoretically investigated RM using a model of the IGMF based on a MHD turbulence dynamo (Ryu et al. 2008; Cho et al. 2009). In the previous KAS meeting, we reported the results for the present-day local universe; for instance, the probability distribution function (PDF) of |RM| follows the lognormal distribution, the root mean square (rms) value for filaments is ~1 rad m^{-2}, and the power spectrum peaks at ~1 h^{-1} Mpc scale. In this talk, we extend our study of RM; by stacking simulation data up to redshift z=5 and taking account of the redshift distribution of radio sources, we have reproduced an observable view of RM through filaments against background radio sources. Our findings are as follows. The inducement of RM is a random walk process, so that the rms of RM increases with increasing path length. The rms value of RM for filaments reaches several rad m^{-2}. The PDF still follows the lognormal distribution, and the power spectrum of RM peaks at less than degree scale. Our predictions of RM could be tested, for instance, with LOFAR, ASKAP, MEERKAT, and SKA.

[구IM-16] Turbulence in Molecular clouds : Observation versus Simulation

조현진[1], 강혜성[1], 류동수[2], 김종수[3], 조정연[2]
[1]부산대학교, [2]충남대학교, [3]한국천문연구원

We have studied the statistical properties of turbulence in molecular clouds identified in the Boston University - Five College Radio Astronomy Observatory (BU-FCRAO) Galactic Ring Survey (GRS). Toward this end, the probability density function (PDF) and velocity distribution were measured for about 50 molecular clouds. We found there exists a good correlation between the PDF width and the velocity dispersion for these molecular clouds. In order to investigate how general properties of astrophysical turbulence depends on the plasma parameters such as magnetic field strength and sonic Mach number, we performed three-dimensional MHD simulations. We then examined if the observed characteristics of interstellar turbulence are consistent with theoretical results from MHD simulations.