Magnetic Fields in the Large-Scale Structure of the Universe

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Abstract

Magnetic fields appear to be ubiquitous in astrophysical environments including the large-scale structure of the universe. The existence of magnetic fields in the cosmic web of clusters, filaments and voids has been established through observations of Faraday rotation, synchrotron emission, and gamma-ray. Yet, the nature and origin of the magnetic fields remains controversial and largely unknown. In this talk, I briefly summarize recent developments in our understanding of the nature and origin of the magnetic fields. I also describe a plausible scenario for the origin of the magnetic fields; seed fields were created in the early universe and subsequently amplified during the formation of the large-scale structure of the universe. I then discuss the prospect of studies of the magnetic fields in the cosmic web with the upcoming facilities.