

The Structure Formation of Cosmic Magnetic Fields in Astrophysical Jets

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We carried out 3-D magnetohydrodynamic (MHD) simulations of astrophysical jets emerging from magnetized accretion disks around black holes. The previous study of astrophysical jets has been concentrated on the effects of large-scale magnetic fields permeating accretion disks. Recently, many MHD disk-jet simulations, starting with magnetic fields confined within the disks, have been published. This is because, it has been widely accepted that the dynamo action inside the magnetized disks can determine not only the evolution of disks, but also the formation of jets. We found, for the first time, that the emergence of large-scale helical magnetic fields (so-called as a magnetic-tower) from the disks as a result of the disk dynamo, and the formation of jets driven by the magnetic-tower without the initial large-scale fields. Here we discuss about the magnetic-tower jets can be one of the most powerful process for the formation and the evolution of the large-scale structured cosmic magnetic fields.