HIGH FREQUENCY OBSERVATIONS OF A LARGE FARADAY ROTATION GALAXY IN A CLUSTER

M. Inoue, H. Tabara*, T. Kato* and K. Aizu†

Nobeyama Radio Observatory, Nobeyama, Minamisaku, Nagano 384-13, Japan
*Utsunomiya University, Utsunomiya, Tochigi 321, Japan
†Katahira 3-24-3, Asao-ku, Kawasaki 215, Japan

We present 22 and 49 GHz interferometric observations of Hyd A (3C218). The source was found to have a very large Faraday rotation measure (RM) (Kato et al. 1987), and to be a dominant member of a luminous X-ray cluster with a large cooling flow (David et al. 1988). These characteristics are very similar to those of Cyg A which is suggested to produce a large RM within a dense sheath around the radio lobes as a result of somehow an interaction between dense intracluster medium (ICM) and radio jets and/or lobes (Dreher et al. 1987). Hyd A is the second example of Cyg A type source. In case of Cyg A, hot spots are the place where the interaction between jets and ICM occurs (Carilli et al. 1988). We then expect in Hyd A that similar interaction also occurs to form hot spots, and consequently that high frequency observations reveal structures of the interaction.

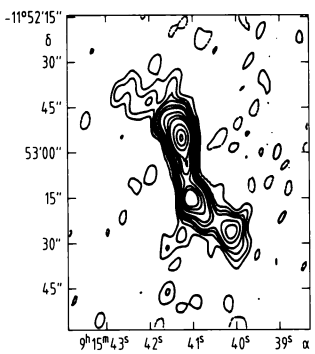

Figure 1. Our 22-GHz map of Hyd A.

The observations were carried out in winter of 1987 and 1988 at 22 and 49 GHz, respectively, using the Nobeyama Millimeter Array. Weak nucleus is located in between the dominant lobes of north-south direction, which are separated by 20", or 20 kpc at this distance (z=0.053, H_0=75 km/s/Mpc). Unlike Cyg A, weak lobes extend towards northeast and southwest direction. This symmetrical "S" shaped structure suggests a precessing motion. At 49 GHz, these two dominant lobes are also predominated. The peak intensity ratio of the two dominant lobes is 2.5 and 5 at 22 and 49 GHz, respectively. This suggests a different structure between two lobes. In fact, recent high resolution observation at 5 GHz with VLA shows asymmetric hot (or warm) spots of the lobes (Taylor et al. 1989). This asymmetry is quite different from the case of Cyg A, and suggests a fine structure of the magnetic field in ICM around Hyd A.

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R. Beck et al. (eds.), Galactic and Intergalactic Magnetic Fields, 486.
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https://doi.org/10.1017/S0074180900190953 Published online by Cambridge University Press