

ASCA Observations of the Superluminal Jet Source GRO J1655-40

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GRO J1655-40 is one of the Galactic superluminal jet sources. The large mass function indicates that the compact object is a black hole. Such objects, called “microquasar”, are the best targets to understand the relation between jet formation and a black hole.

ASCA observations of GRO J1655-40 performed in 1994, 1995, and 1996 have revealed the presence of K_{α} resonance absorption lines from highly ionized iron ions in the X-ray spectra (Ueda et al. 1998). The center energy of the absorption line varies according to X-ray intensity: it corresponds to that of K_{α} line of H-like iron and of He-like iron when the X-ray intensity is high (2.2 Crab) and low (0.27–0.57 Crab), respectively. These results suggest that the high temperature plasma producing the absorption lines is located in a non-spherical configuration and is photo-ionized by X-ray radiations.

To investigate the geometry of the plasma in detail, we performed a long observation of this source over an orbital period (2.6 days) from 1997 Feb. 26 to Feb. 28. The average X-ray intensity was 0.9 Crab and a blend of two absorption lines from H-like and He-like iron was detected. This is consistent with the photo-ionization scenario by comparison with the previous observations. The absorption lines are always detected over the full orbital phase. This fact indicates that the plasma is located symmetrically with respect to the rotation axis of the accretion disk. K_{α} absorption lines from H-like calcium were also detected. The continuum can be fitted with the multicolor disk model with the innermost temperature of 1.17 ± 0.01 keV plus a power law.

In this paper, we report the results of the observation in Feb. 1997, and discuss the origin of the X-ray emission and the nature of the plasma that produces the absorption lines.