X-rays from the Brown Dwarf BD TWA-5B

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Abstract

With mass well below the hydrogen burning mass limit (< 0.08 $M_\odot$), brown dwarfs (hereafter BDs) had been expected to have no high energy activity. Surprisingly, however, persistent X-rays from several young BDs and BD candidates (1–5 Myr old) in star-forming regions, were detected with *ROSAT* and *Chandra* (ex. Neuhäuser et al. 1999, Imanishi et al. 2001). Recently, X-ray flares from old BDs (0.5–1 Gyr) were also observed with *Chandra* (Fleming et al. 2000; Rutledge et al. 2000), while no steady X-ray was found from them. On the other hand, no X-ray data has been available for BDs of intermediate ages (3–100 Myr).

To give definite restriction to the evolution of BDs, we executed *Chandra* observations of an intermediate age (10 Myr) BD TWA-5B. The BD lies 55 pc away from the earth with mass of 15–40 M_{jup}, and is a companion of a T Tauri star TWA-5A. Although the separation to the primary is only $2''$, we detected X-rays from TWA-5B, with superior spatial resolution of *Chandra/ACIS*. We will present X-ray properties obtained from spectral and timing analysis, and discuss the X-ray evolution of BDs.

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