

A HARD X-RAY OBSERVATION OF CYG X-1 IN 1985

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On September 22, 1985, a hard X-ray observation of Cyg X-1 was performed by using a balloon-borne CsI-NaI phoswich telescope HAPI-2 at Xianghe Balloon Facility in China. The main detector is CsI(Tl) with a thickness of 0.4cm and an area of 140cm². The energy range is 20-200KeV. The telescope reached a float altitude of about 38Km(4g/cm²). The photon's arrival time and energy loss spectrum were measured for both background and active tracking on-source observations.

For deconvoluting an observed energy loss spectrum I', we quoted two commonly used methods: a) Minimize the objective function χ^2 for a given expected incident photon spectrum f(E,c) to get the optimum estimation of the parameters c and relevant confidence regions; b) Solve the matrix equation I'= F*I, then fit the estimation of the incident photon spectrum I with a function f(E,c) by minimizing χ^2 . The response function F of the detector was obtained by Monte-Carlo simulation. The incident photon spectrum shown here, which was obtained by the method b) using a simplified diagonal matrix F, lies on the superlow state spectrum suggested by Ling et al.(1983) above 90KeV. The X-ray luminosity in 10-200KeV was estimated as (1.07±0.08)x10³⁷ ergs/s from a fitted thermal spectrum (A/E) exp(-E/B), where A is 0.114 (+0.010, -0.009) and B is 103.0(+10.2,-8.9). These indicate that Cyg X-1 probably was not in the normal low state.

References

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