Type: XMM-Newton Interim Report

Proposal Number: 5514

Proposal Title: Search for X-Ray Emission in the Nearest Known Brown Dwarf

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Summary of Project

Techniques Used

The XMM observation were obtained on 2001 January 07-08 for 51767 s. The Optical Monitor (OM) was used with the V filter for 4 exposures of 5000 s each in imaging mode. We used the data given by the OM to confirm the presence of the source in the field of view.

The European Photon Imaging Camera (EPIC) MOS1 and MOS2 were used 48724 s each in prime full window mode with 2.5 s time resolution. The EPIC PN was used 46618 s in prime full window mode with 73.4 ms time resolution. The X-ray source closest to the expected position of our target is offset by delta R.A=2.5 arcsec and delta Dec=-28.37 arcsec. This offset is high in comparison with the 0.4 arcsec observed with the optical data. So at this point we already knew that the target was not detected. To confirm that conclusion, we performed the identification of all X-ray sources in the field

of view by comparing source to source our image with the one obtained by Rutledge et al. (2000) with Chandra. This allowed us to identify all the X-ray sources in our field of view in an area of 20 arcsec times 10 arcsec centered on the expected coordinates of LP944-20. We were then able to conclude that the target was not detected during this observation.

Findings

This result allowed us to determine a new and better 3 sigma upper limit of X-Ray emission for this object. We have also derived duty cycles for X-ray flares as a function of X-ray luminosity by comparing the XMM data with Chandra and ROSAT data. The XMM observations give a new insight into the activity of brown dwarfs.

One student has been supported with the grant during four months (Herve Bouy). A Sun workstation was purchased for him.

Publication and Dissemination of Results

Our results were presented in a talk delivered by the PI at the Mini-Symposium MS-7 on 'Magnetic Activity in Stellar Evolution' in the JENAM 2001 held in Munich on September 13/14 2001. The title of the talk was "The End of Stellar Activity: XMM-Newton Observation of a Nearby Brown Dwarf".

A paper for the refereed journal New Astronomy has been submitted. We are currently working on revisions suggested by the referee.

A no-cost extension is being requested to pay for publication charges in New Astronomy.