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*Letter to the Editor*

# A broad absorption feature in the X-ray spectrum of the isolated neutron star RBS1223 (1RXS J130848.6+212708)*

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## Abstract

X-ray spectra of the isolated neutron star RBS1223 obtained with the instruments on board XMM-Newton in December 2001 and January 2003 show deviations from a Planckian energy distribution at energies below 500 eV. The spectra are well fit when a broad, Gaussian-shaped absorption line with $\sigma = 100$ eV and centered at an energy of 300 eV is added to an absorbed blackbody model. The resulting equivalent width of the line is -150 eV. However, the spectral resolution at these low energies of the EPIC detectors and the lower statistical quality and restricted energy band of the RGS instruments are not sufficient to exclude even broader lines at energies down to 100 eV or several unresolved lines. The most likely interpretation of the absorption feature is a cyclotron absorption line produced by protons in the magnetic field of the neutron star. In this picture line energies of 100–300 eV yield a magnetic field strength of 2–6$_{\times 10^{13}}$ G for a neutron star with canonical mass and radius. Folding light curves from different energy bands at a period of 10.31 s, which implies a double peaked pulse profile, shows different hardness ratios for the two peaks. This confirms that the true spin period of  is twice as long as originally thought and suggests variations in cyclotron absorption with pulse phase. We also propose that changes in photo-electric absorption seen in phase resolved spectra of  by Cropper et al. ([CITE]), when formally fit with an absorbed blackbody model, are caused instead by cyclotron absorption varying with pulse phase.

**Key words:** stars: individual: = / stars: neutron / stars: magnetic fields / X-rays: stars

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