*RevMexAA (Serie de Conferencias)*, **20**, 208–208 (2004)

# THE NATURE OF THE COMPACT OBJECT IN THE HARD X-RAY SOURCE 4U2206+54

J. M. Torrejón,[1] I. Kreykenbohm,[2] A. Orr,[3] L. Titarchuk,[4] and I. Negueruela[1]



**We present an analysis of archival *RXTE* and *BeppoSAX* data of the X-ray source 4U2206+54. For the first time, high energy data ($\geq$ 30 keV ) is analyzed. The data is well described by comptonization models in which seed photons with temperatures between 1.1 keV and 1.5 keV are comptonized by a hot plasma at 50 keV thereby producing a hard tail which extends up to 100 keV . From luminosity arguments it is shown that the area of the soft photons source must be small ($r \approx 1$ km) and that the presence of an accretion disk in this system is unlikely. Here we report on the possible existence of a cyclotron line around 30 keV . The presence of a neutron star in the system is strongly favored by the available data.**

## 1. INTRODUCTION

High Mass X-ray binaries (HMXRBs) are often subdivided in two broad categories depending on the type of the optical companion: Supergiant systems and Be/X systems. The vast majority of these High Mass X-ray Binaries harbour X-ray pulsars. Around 70% of all known X-ray pulsars are in Be/X-ray systems. These are believed to be young neutron stars with relatively strong magnetic fields ($B \sim 10^{12}$ G). Among the handful of HMXRBs not displaying the X-ray pulsations, three show the typical characteristics of black hole transients. There are however other HMXRBs in which pulsations have not been detected, in spite of intensive searches, that do not display the characteristics of black hole candidates. The nature of their compact objects is therefore unknown. One such system is 4U2206+54.

## 2. THE NATURE OF 4U2206+54

We have analyzed X-ray data in three different epochs. The source presents 'state transitions' being harder when dimmer. The spectra can be well described by comptonization models. We use either thermal comptonization (`compTT`) or Bulk Motion Comptonization (`bmc`). These models describe seed photons with temperatures between 1.1 keV and 1.5 keV that are upscattered by a hot plasma at 50 keV . This produces a hard tail which extends at least up to 100 keV . We demonstrate that the luminosity of the soft photon source is in contradiction with its high temperature (above $\sim$ 1 keV ) if this source is an accretion disk. The area of the soft photons source must be small ($r \approx 1$ km) and, lacking of accretion disk, the natural (and maybe the only) possibility is a hot spot over a NS surface. These conclusions are supported by the presence of an absorption dip around 30 keV which we interpret as a cyclotron feature. Although its detection is uncertain it is detected with two different instruments in three different epochs.

This work has been supported by grants: ESP2001-4541-PE and ESP2002-04124-C03-03 of the Spanish Ministerio de Ciencia y Tecnología.

## REFERENCES

Torrejón J.M., Kreykenbohm I., Orr A., Titarchuk L., Negueruela I. 2003, A& A, submitted

[1]Departamento de Física, Ingeniería de Sistemas y Teoría de la Señal, Escuela Politénica Superior, Universidad de Alicante, Spain.
[2]Institut für Astronomie und Astrophysik – Astronomie, Tübingen, Germany.
[3]ESA/ESTEC Research and Science Support Division, Noordwijk, The Netherlands.
[4]US Naval Research Laboratory, Space Science Division, Washington, USA.