

RAPID OPTICAL VARIABILITY OF THE X-RAY PULSATOR GX 1+4

João Braga, Francisco F. Jablonski, and Flávio Elizalde

Instituto Nacional de Pesquisas Espaciais, Brazil

and

João E. Steiner

Instituto Astronômico e Geofísico

Universidade de São Paulo, Brazil

The X-Ray Pulsator GX 1+4 is one of the most intriguing objects in the Galaxy. In its "on" state, it is one of the most luminous galactic X-ray sources ($\sim 10^{38}$ erg s $^{-1}$ for a distance of ~ 8 kpc). The derivative of its pulsating period has one of the largest values measured so far for this kind of object ($\dot{P} \sim -6 \times 10^{-8}$ s/s) and can change abruptly, showing episodes of spin-down behavior. Furthermore, GX 1+4 is the only X-ray pulsator in the vicinity of the galactic center and is a hybrid case between low-mass X-ray binaries and massive X-ray binaries, inasmuch as its optical spectrum shows high-excitation features (e.g., [Fe VII]) and a late-type absorption system, which characterizes the optical counterpart (V2116 Oph, $V = 18.7$) as a symbiotic red supergiant ($\sim$ M6 III) star. This optical spectrum was originally attributed to the presence of an envelope of gas around the system with density $\sim 10^9$ cm $^{-3}$ and radius ~ 4 AU. However, this model is inconsistent with the strength of the observed [O III] $\lambda 5007$ line. Using the CLOUDY code (Ferland 1990, OSU Internal Report 90-02) to reproduce the observed optical spectrum, we have obtained preliminary estimates for the density profile of the gas and the size of the emitting region. The results show that the density should probably increase with a low power of r and the region probably extends from 0.1 to 100 AU. 15 s integrations in the R filter made with a CCD camera in the 1.6-m telescope of Laboratório Nacional de Astrofísica (Brazil) show fast variability (~ 15 minutes) and hints of modulations at 16.7 and 8.8 hours. In this paper we discuss the implications of our observations to the models currently proposed for this object.

EVOLUCION DE LA POLARIZACION DE LA SN 1987A

O. Benvenuto, C. Feinstein, y M. Méndez

Universidad Nacional de La Plata, Argentina

Se presentan nuevas medidas de la polarización de la SN 1987A. Estas indican que los efectos del material en la línea de la visual hacia SK

–69° 202 es mayor que lo supuesto anteriormente. Se discute entonces cuál fue la evolución de la polarización durante los primeros meses a partir de considerar una componente "foreground" diferente a la analizada en trabajos anteriores. Los resultados obtenidos indicarían que la componente observada en el segundo mes de la explosión podría ser explicada por inestabilidad Rayleigh-Taylor o por interacción con material que tendría la misma simetría que el anillo descubierto por el Telescopio espacial Hubble.

VLA OBSERVATIONS OF THE SUPERNOVA REMNANT 3C400.2

G. Dubner

Instituto de Astronomía y Física del Espacio, Argentina

E. Giacani

Instituto de Astronomía y Física del Espacio, and
Instituto Argentino de Radioastronomía

W.M. Goss

National Radio Astronomy Observatory, U.S.A.

and

P.F. Winkler

Middlebury College, U.S.A.

We report new radiocontinuum images of the supernova remnant 3C400.2 at 327 MHz and 1465 MHz obtained with the Very Large Array (VLA) of the NRAO¹. The observations at 327 MHz were done with the VLA in the C and D configurations (synthesized beam of about 1' and rms noise of the order of 1.5 mJy/beam). The observations at 1465 MHz were acquired with the VLA in the D array. With the addition of single dish data, the synthesized beam at this frequency is 52" and the rms noise $\simeq 1$ mJy/beam. Linear polarization was investigated at 1465 MHz.

The present high sensitivity observations reveal the existence of two ring features associated with 3C400.2. A large one, approximately 28' in diameter centered around 19^h36^m40^s, 17°06' and a small one, about 9' in diameter, centered near 19^h00^m05^s, 17°11'. The small structure appears overlapping the NW corner of the larger one.

An excellent correlation is found among the newly discovered radio features and the optical and soft X-ray emission associated with 3C400.2

¹ Operated by Associated Universities Inc., under co-operative agreement with the National Science Foundation.