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A NEW VIOLENT ACTIVITY IN 3C273

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ABSTRACT In the present paper we report a sharp rise in the flux density of the quasar 3C273 observed with the Itapetinga radiotelescope in 1991. The intensity increased by factor 2, reaching a maximum value in May and July 1991 at 43 and 22 GHz, respectively.

INTRODUCTION

The quasar 3C273 is the nearest quasar known (Z=0.158) and intrinsically quite luminous. Since the first clear evidence for radio variability, when Dent (1965) observed a 40% increase in the flux density at 3.75 cm over a 1000-days period, a number of multifrequency studies have been published.

We have observed 3C273 at 22 and 43 GHz during the last 12 years and we have noticed a complex behaviour of this source (Botti and Abraham 1987; Botti and Abraham 1988; Abraham and Botti 1990; Botti and Abraham 1991). From this studies there are evidences of quasiperiodic variations, large outbursts of energy on a time scale as short as a few months and continuous decreasing in the flux density.

OBSERVATIONS

The observations were made at the frequencies of 22 and 43 GHz with the 13.7-m radome enclosed Itapetinga radiotelescope, during the period from July 1980 to July 1992.

The feed consisted of a rectangular horn, sensitive to the vertical component of the E vector. The half-power beamwidths were 4.2' and 2.1' at 22 and 43 GHz, respectively. The receiver was a K-band mixer with 1 GHz d.s.b., giving a system temperature of about 700K. The receiver was operated in the total-power mode. The observations consisted of scans through the source at constant elevation, with an amplitude in the sky of 60' at 22 GHz and 30' at 43 GHz. Each observation consisted on the average of 30 scans of 20s duration and was

preceded by a calibration with a noise source and with a room-temperature (Abraham et al. 1986).

RESULTS

We can note from the figure 1 different phases in the last 12 years. In 1980, 3C273 was in a low-flux density state, with approximately 25 Jy at 22 GHz. However, during the following 4 years this object remained at a high level, with quasiperiodic fluctuations and time scales of about 1 year. During this stage, 3C273 reached approximately 50 Jy in November 1983 at 22 GHz and 50 Jy in July 1984 at 43 GHz. Following this high state there was a continuous decreasing during approximately 15 months. In that case, the flux density reached a minimum value in April 1986 at both frequencies.

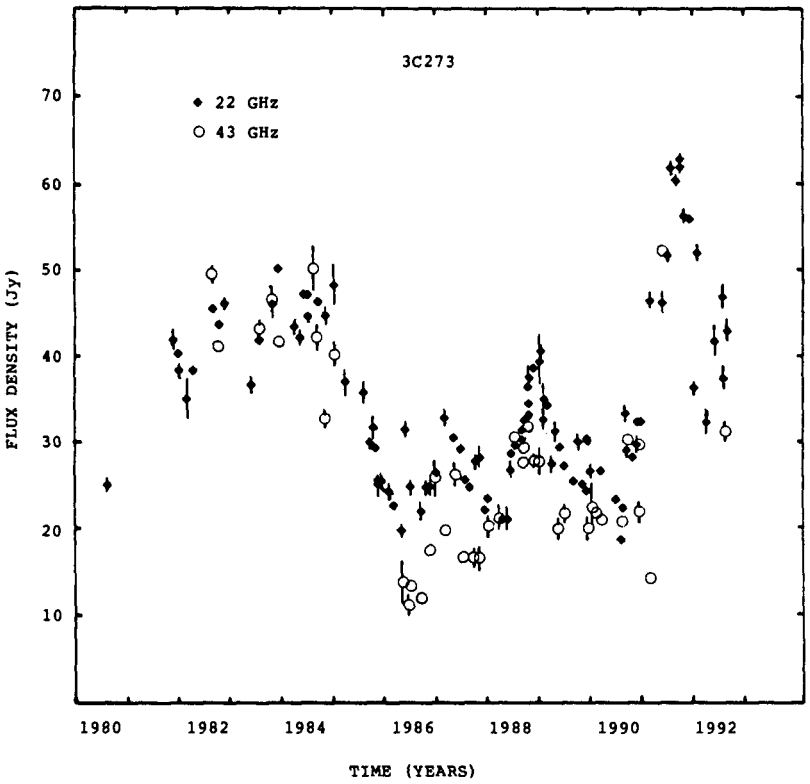

Figure 1 - The behaviour of the quasar 3C273 at 22 and 43 GHz with the strong outburst detected in 1991.

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Starting in May 1986 and ending in April 1988 there was a period of a low-flux density with amplitude variations of about 10 Jy at 22 and 43 GHz. We have noticed from 1986-1988 period a delay of 1.4 months and a similar behaviour between 22 and 43 GHz data.

In 1988 there was an outburst at both frequencies with the flux density reaching approximately 41 Jy in December 1988 and 32 Jy in September 1988 (22 and 43 GHz, respectively). This corresponds to changes in a flux density of about 95% at 22 and 43 GHz in a period of about 8 months.

Another continuous decreasing began in July-August 1988 at 43 GHz and in January 1990 at 22 GHz. During the period 1989-1990, 3C273 remained in a low-flux density state.

A strong outburst was detected in 1991, with the flux density remained above 60 Jy during 4 months at 22 GHz. The high intensity observed is bigger than previous values reported in the last 12 years. Although the observations at 43 GHz during the period were scarce they seem to follow the same pattern as the 22 GHz data. If we consider that the maximum flux density occurred in May 1991 and July 1991 at 43 and 22 GHz, respectively, we can obtain the same value of delay as observed in the outburst of 1988. This corresponds to the same distance crossed by light through the source at both epochs.

A decreasing in the flux density was observed, starting in October 1991 and ending in December 1991, when 3C273 reached approximately 36 Jy at 22 GHz and 31 Jy at 43 GHz. Afterward this continuous decreasing, took place another outburst with smaller amplitude.

The present study has showed a complex pattern of variability of 3C273 during 12 years. Several outbursts observed in the continuum can be associated with structures detected with VLBI (Botti and Abraham 1988) and the last outburst observed at 22 and 43 GHz can be associated with a new component ejected from the nucleus of 3C273.

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REFERENCES

Abraham, Z., Botti, L.C.L., and Del Ciampo, L.F. 1986, Rev. Mexicana de Astron. Astrof., **12**: 414.

Abraham, Z., and Botti, L.C.L. 1990, in Parsec-Scale Radio Jets, ed. J.A. Zensus, and T.J. Pearson (Cambridge: Cambridge University Press), p. 1.

Botti, L.C.L., and Abraham, Z. 1987, Rev. Mexicana Astron. Astrof., **14**, 100.
Botti, L.C.L., and Abraham, Z. 1991, in Variability of Blazars, ed. E. Valtaoja, and M.J. Valtonen (Cambridge: Cambridge University Press), p. 170.
Botti, L.C.L., and Abraham, Z. 1988, A.J., **96**, 465.
Dent, W.A. 1965, Science, **148**, 1458.