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Title : Measurements of Beam Shape at 1.4 Ghz

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Keywords: Beam shape , L band , feed system

ABSTRACT

The beam shape of C3 with the RRI L band feed has been measured. The measured beam widths (FWHP) are 28 arc min in elevation and 26.5 arc min in elevation with an error of about a minute of arc. The 1.0 GHz beam width is not significantly broader than the 1.4 GHz beam. There is no clear evidence for any large scale plateaus in the beam shape.

Measurements of Beam shape at 1.4 GHz

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keywords - beam shape , L band , feed system

Scans on Casa and CygA were made on 22 Feb 93 to measure the beam shape of C3 antenna with the RRI 21cm feed.

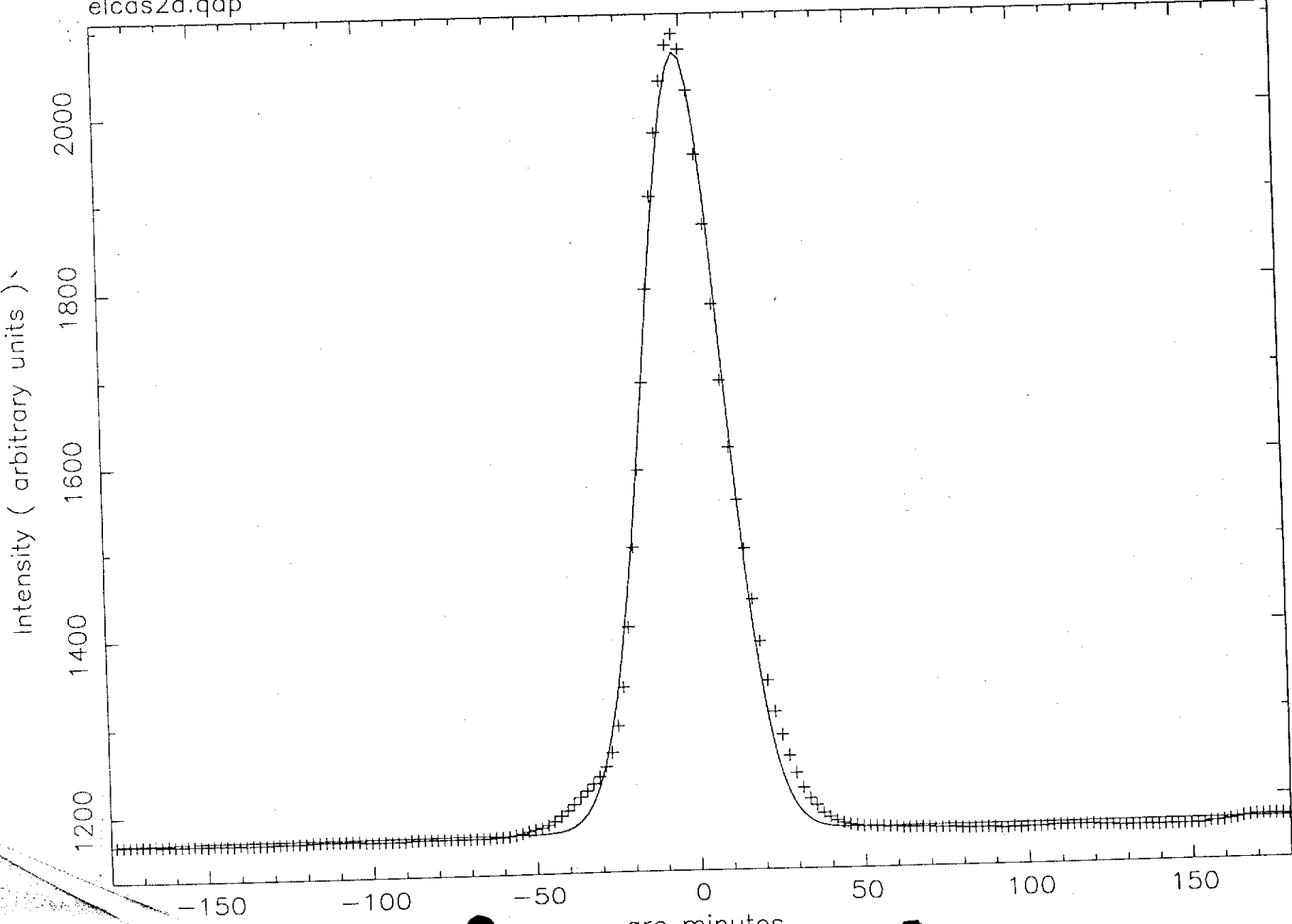
Fig 1 a,b and c show the results of the elevation scans. Each measurement point corresponds to a integration time of 1s with the antenna scanning at a rate of +2 degrees per minute. The noise on each measurement is about 1 count, less than the height of the cross representing each point. The data were fitted with a model consisting of a constant with a linear trend and a gaussian. The fitted line is shown as the solid line. The estimated beam width (FWHP) was 28 arc min for all the 3 scans. The fact that we get the same diameter at both 1.4 and 1 GHz may not be too surprising since the illumination of the dish is heavily tapered by the horn.

A similar procedure was carried out for azimuth except that the scanning rate was 2 degrees per minute in encoder azimuth and so a $\cos(\text{elevation})$ correction has to be applied to get the actual beam width. The measurements and the fits are shown in fig 2 a,b and c and the resulting FWHM widths are 26, 25 and 28.2 arc minutes respectively. The reason for the larger scatter in the azimuth widths compared to the elevation width is unclear though it is not clear which is the anomalous result.

The scans were looked at to see if any low level plateaus were present. No repeatable plateaus were seen, tho there were a number of steps in individual scans.

Elevation scan on CAS A at 1.4 GHz

elcas2d.qdp

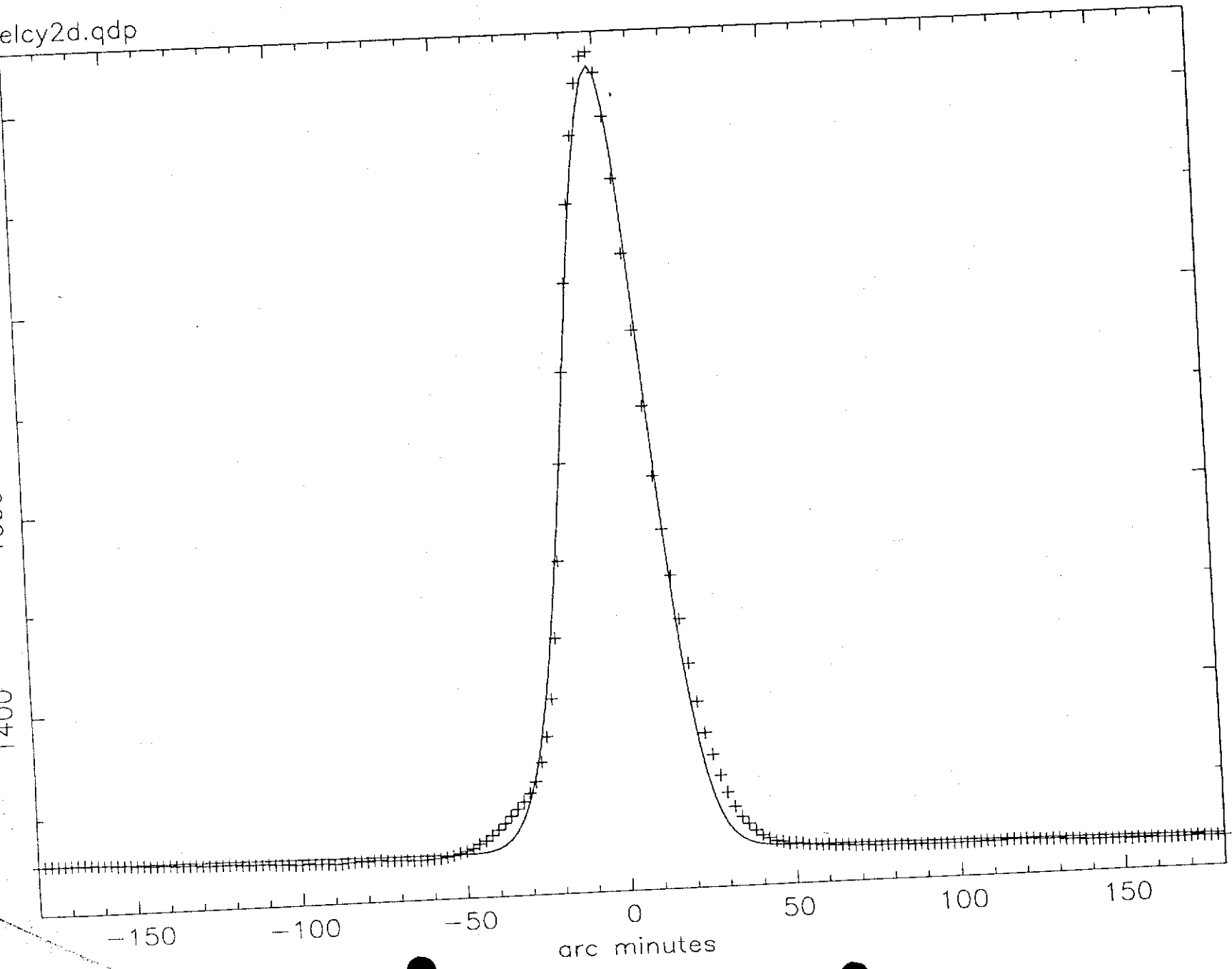


CO= 1171. , LI= 1.1080E-02, GC= -2.004 , GW= 11.96 , GN= 895.7
WV= 3.4501E+04, N= 180.0

Fig 1a

Elev Scan on 2971100

elcy2d.qdp

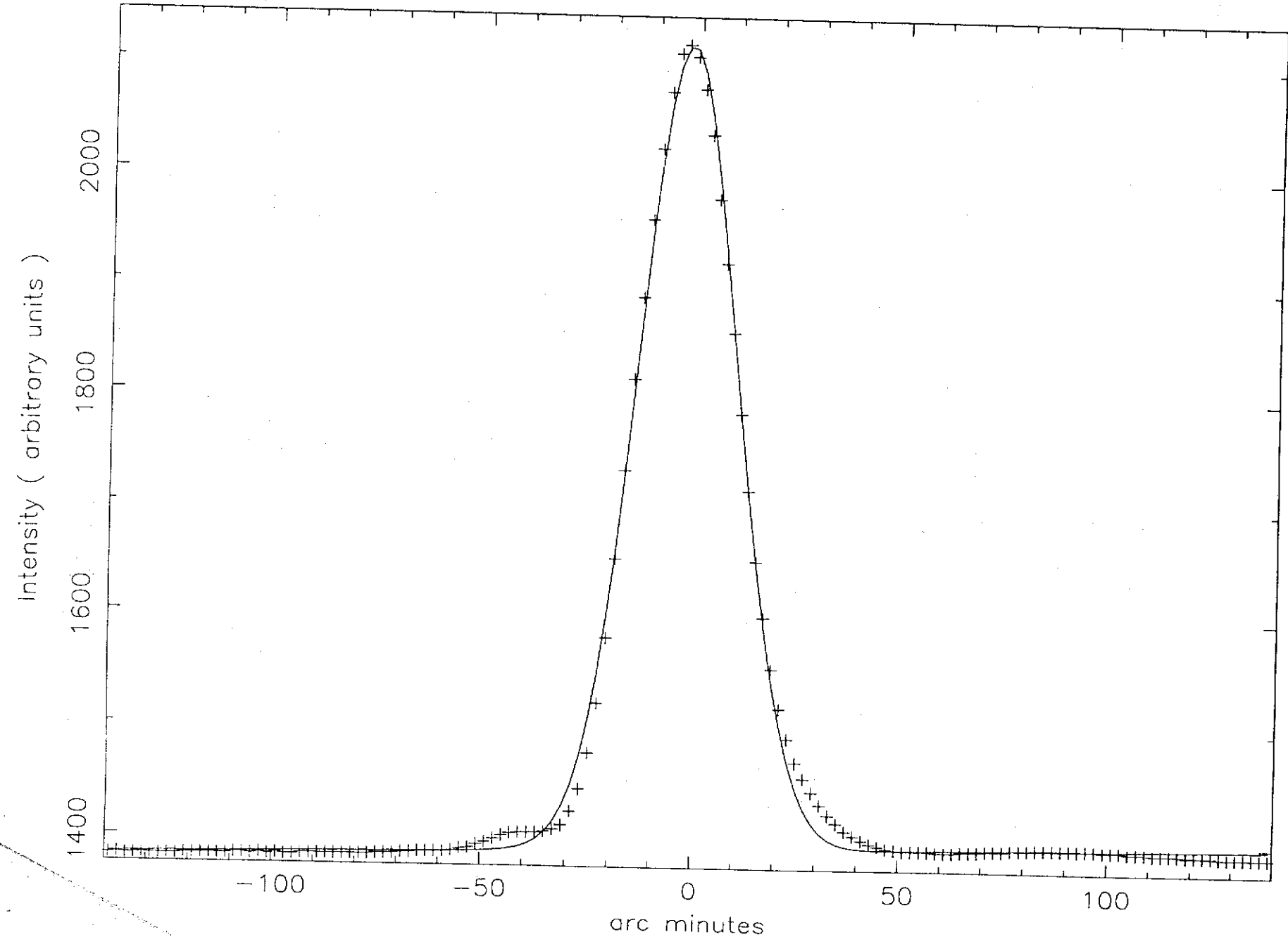


CO= 1245. , LI=-4.7848E-02, GC= -1.959 , GW= 11.95 , GN= 784.9
WV= 2.7069E+04, N= 181.0

| b

Elevation scan on CAS A at 1.0 GHz

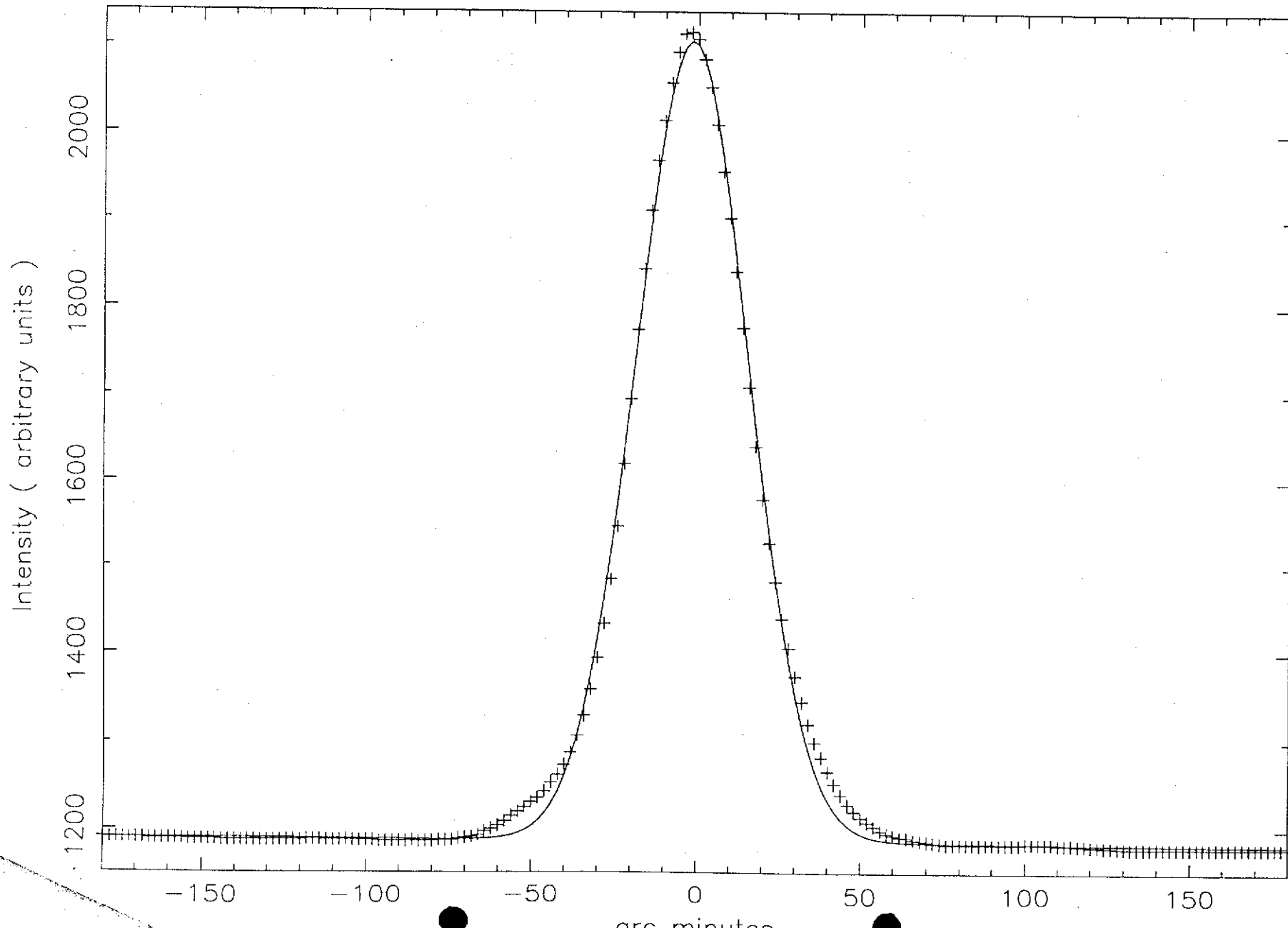
elca2d1.qdp



CO= 1391. , LI= 5.4055E-02, GC= -2.182 , GW= 11.96 , GN= 726.0
WW= 1.2671E+04, N= 140.0

azimuth scan on CAS A

azcas2d.qdp

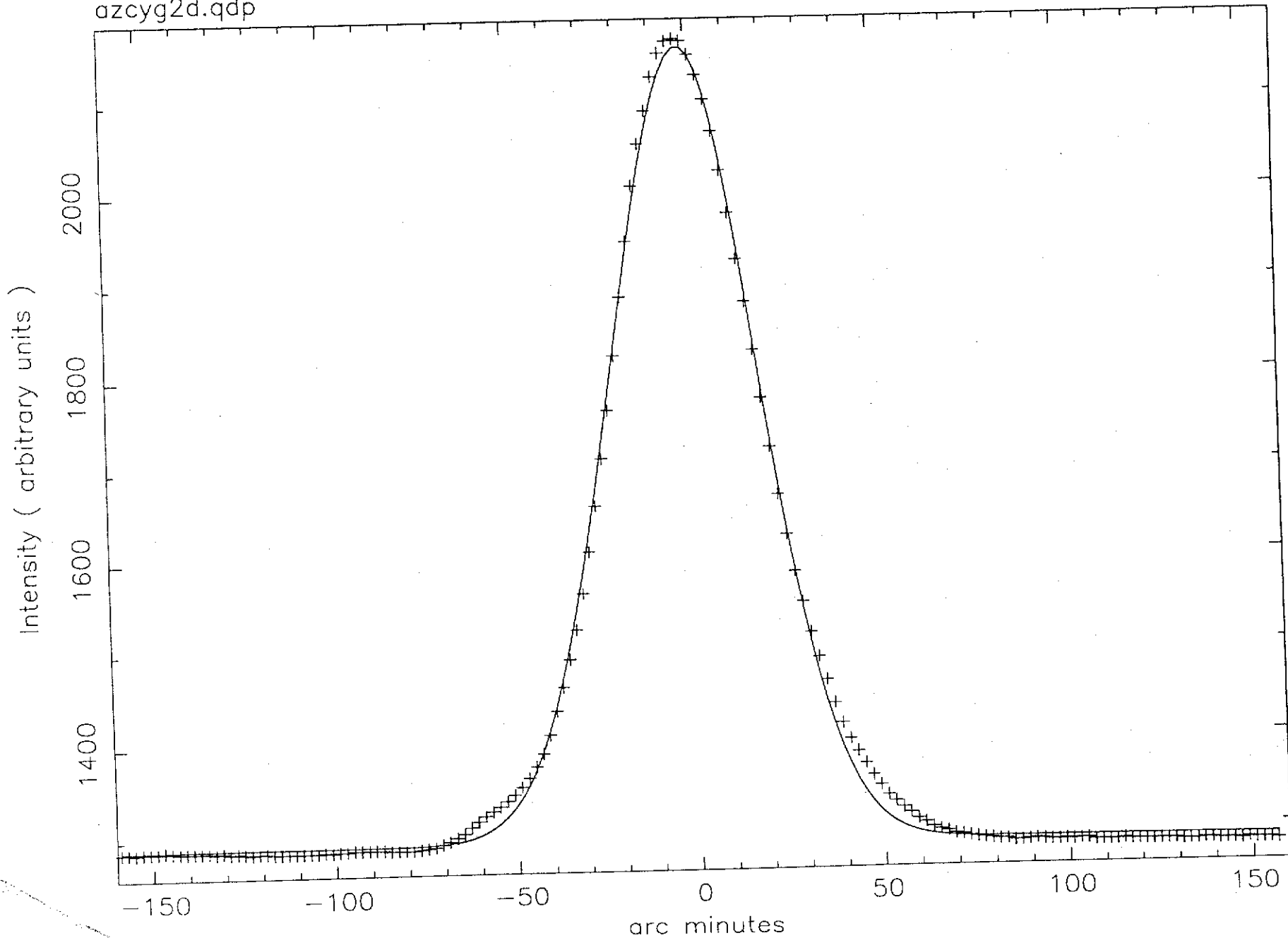


CO= 1186. , LI=-2.4751E-02, GC= -1.624 , CW= 17.08 , CN= 919.8
WV= 2.5792E+04, N= 620.0

Fig 2a

Azimuth Scan on Cygnus A at 1.4 GHz

azcyg2d.qdp

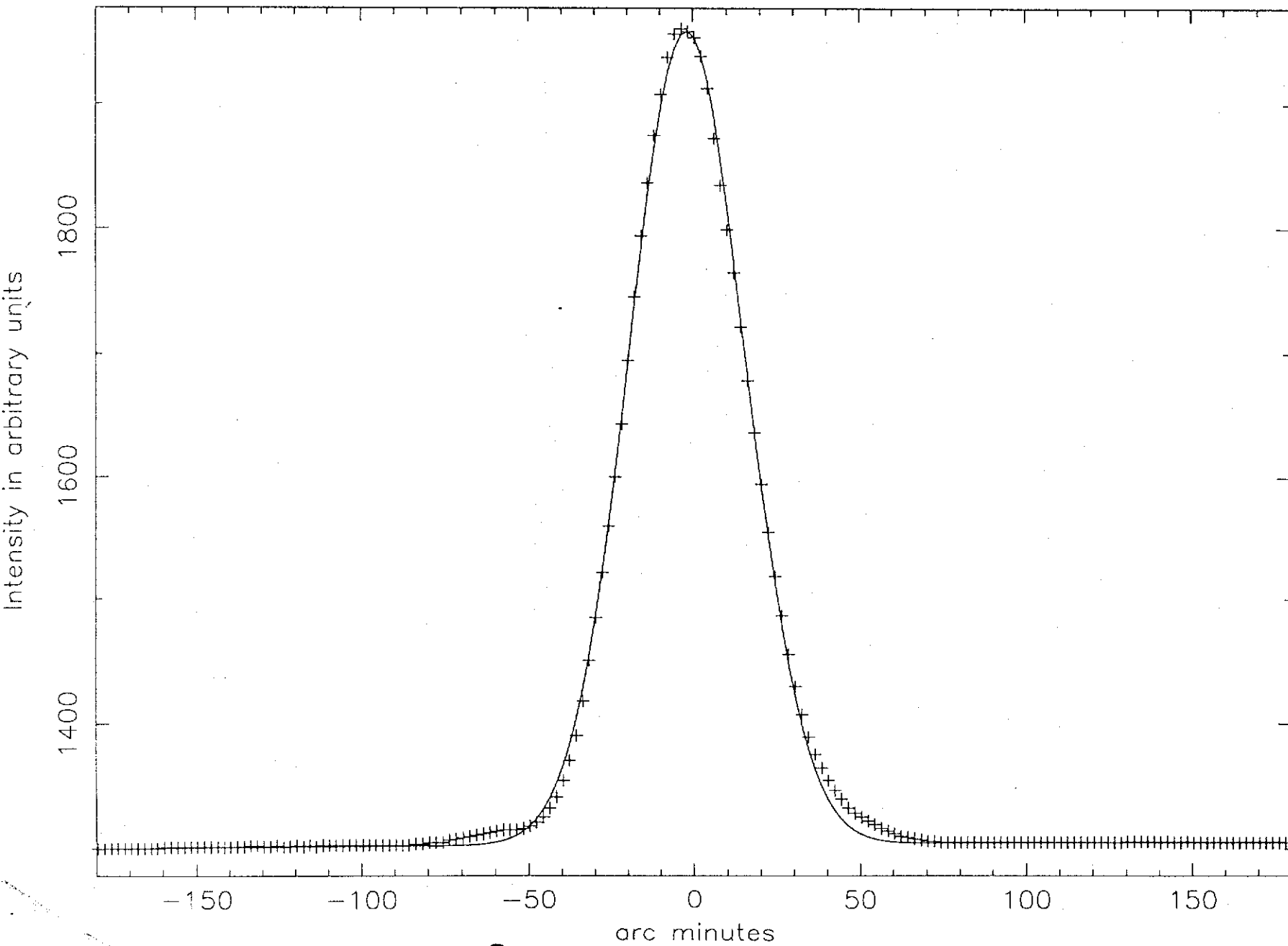


CO= 1288. , LI=-6.5462E-03, GC= -1.891 , GW= 19.77 , CN= 870.5
WV= 1.9429E+04, N= 159.0

Fy sb

Azimuth scan on cas at 1.0 GHz

azca2d1.qdp



CO= 1304. , LI= 1.3701E-02, GC= -1.917 , GW= 17.44 , GN= 656.0
WV= 6269. , N= 585.0

Fig 2c