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IR IMAGING POLARIMETRY OF THE NUCLEAR REGIONS OF CEN A

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INTRODUCTION

Aperture polarimetry of the nucleus of Cen A (Bailey et al. 1986) revealed a very red polarized source present in the K and L bands which was interpreted as a blazar type nucleus. To study this region in more detail we observed it on 1993 May 5 using the IRIS IR camera together with a polarimetry system developed at the University of Hertfordshire.

DISCUSSION

In the J band polarization is mostly along the dust lane, with values reaching 3% at position angles of 117 degrees near the nucleus. This polarization is likely to be due to transmission through aligned dust grains. No significant excess in polarization is seen on the IR jet, which is therefore unlikely to be synchrotron radiation or scattering of nuclear radiation.

In the K_n band the polarization is generally lower than that at J, about 1% over most of the field. This is consistent with transmission through aligned grains which should follow the Serkowski law and fall with increasing wavelength in the IR.

On the nuclear source itself a much larger K band polarization is seen of about 6.5% at a PA of 140 degrees, consistent with the aperture polarimetry of Bailey et al. (1986). It has a polarization of about 8% (after correction for dilution by stellar flux), at an angle roughly perpendicular to the jet direction.

The polarized radiation could be synchrotron emission from a blazar type nucleus, the low apparent luminosity being a consequence of beaming along an axis away from the line of sight. The very red colour would be largely intrinsic. An alternative explanation is that the red colour and polarization could both be due to absorption in a thick inner dust disk. If A_v is about 40 or greater the observed polarization can easily be produced by dichroic absorption. The observed angle would then indicate the orientation of the inner disk.

REFERENCES

Bailey, J. Sparks, W.B., Hough, J.H. and Axon, D.J., 1986, Nature, 322, 150.

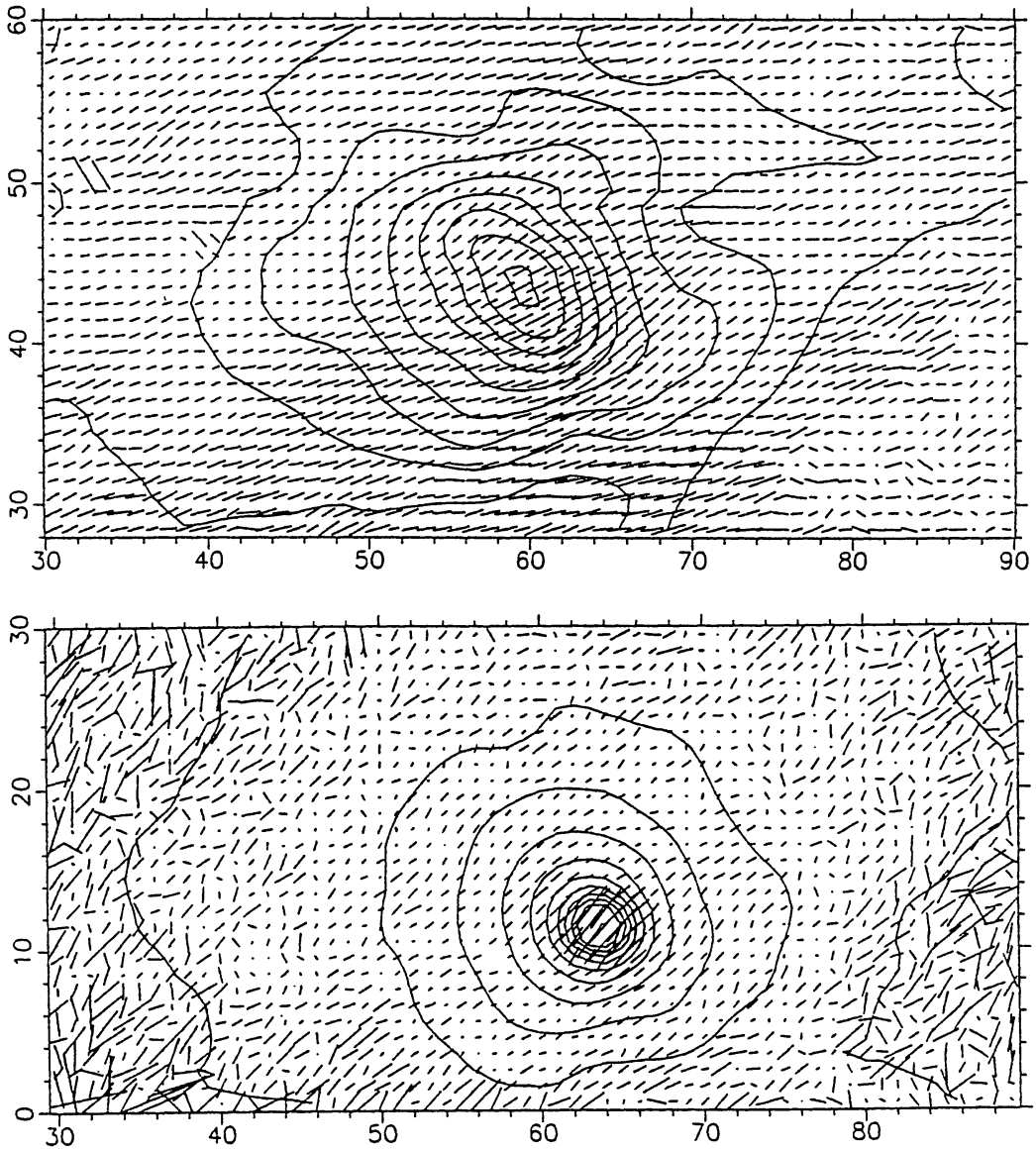

FIGURE I Polarization images of the central region of Cen A in the J (upper panel) and K_n (2.0-2.32μm, lower panel) bands. The images cover about 19 by 36 arc seconds with polarization vectors plotted for every pixel. The contours show the intensity.