

TWO MICRON IMAGING POLARIMETRY OF THE GALACTIC CENTER REGION

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ABSTRACT We have used the KPNO infrared imager at $2.2 \mu\text{m}$ on the 2.1 meter telescope with $0.78''$ pixels to produce polarimetric images of the galactic center region. The polarimeter consisted of a rotating half-wave plate, followed by a fixed analyzer, which was placed in the converging beam directly in front of the imager. Images were made of a field centered on IRS7 "the central field" and of several fields positioned around the dust ring which surrounds the Sgr A HII region. A region of anomalously high polarization ($\sim 15\%$) is observed coincident with a portion of the dust ring.

INTRODUCTION

Previous observations of the galactic center have shown that a level of polarization of $\sim 5\%$ at $2.2 \mu\text{m}$ at the position angle $\sim 10\text{-}15$ degrees exists fairly uniformly over the central $7' \times 7'$ of the galaxy and that some of the $2.2 \mu\text{m}$ point sources show small but significant variations from this pattern (Bailey *et al.*, 1984; Kobayashi *et al.* 1980). The preliminary results of our $2.2 \mu\text{m}$ polarimetry are consistent with this result for a field centered on IRS7. In addition, we observed several fields positioned around the dust ring which surrounds the Sgr A HII region.

RESULTS

Within the central $45'' \times 45''$ field, the average polarization is about 5% at a position angle of $10\text{-}15$ degrees. The values obtained for the polarization of a number of the bright $2 \mu\text{m}$ point sources appear consistent with those previously reported by Lebofsky *et al.* (1982). Analyses of these and other earlier observations have suggested that most of the rather uniform $2 \mu\text{m}$ polarization seen over the central $\approx 5'$ of the galaxy is due to dichroic absorption by aligned grains along the foreground line of sight. We discovered a region of enhanced polarization $\sim 1'$ South of the galactic center in which a 35% decrease in $2.2 \mu\text{m}$ flux is accompanied by a $2.5 \times$ increase in percentage polarization and a 90° change in position angle. A cut through the frame centered on this region is shown in Figure 1 where the flux drops by about

35% while the polarization increases by about a factor of 2.5. The position of this frame relative to the circumnebular dust ring is shown in Figure 2. Although a contribution from scattering cannot be ruled out, both the increase in polarization and the drop in flux seem most naturally attributed to an additional slab of extinguishing, polarizing material along this line of sight.

REFERENCES

- Bailey *et al.* 1984, *M. N. R. A. S.*, 208, 661.
 Kobayashi *et al.* ,1980, *Pub. A. S. J.*, 32, 291.
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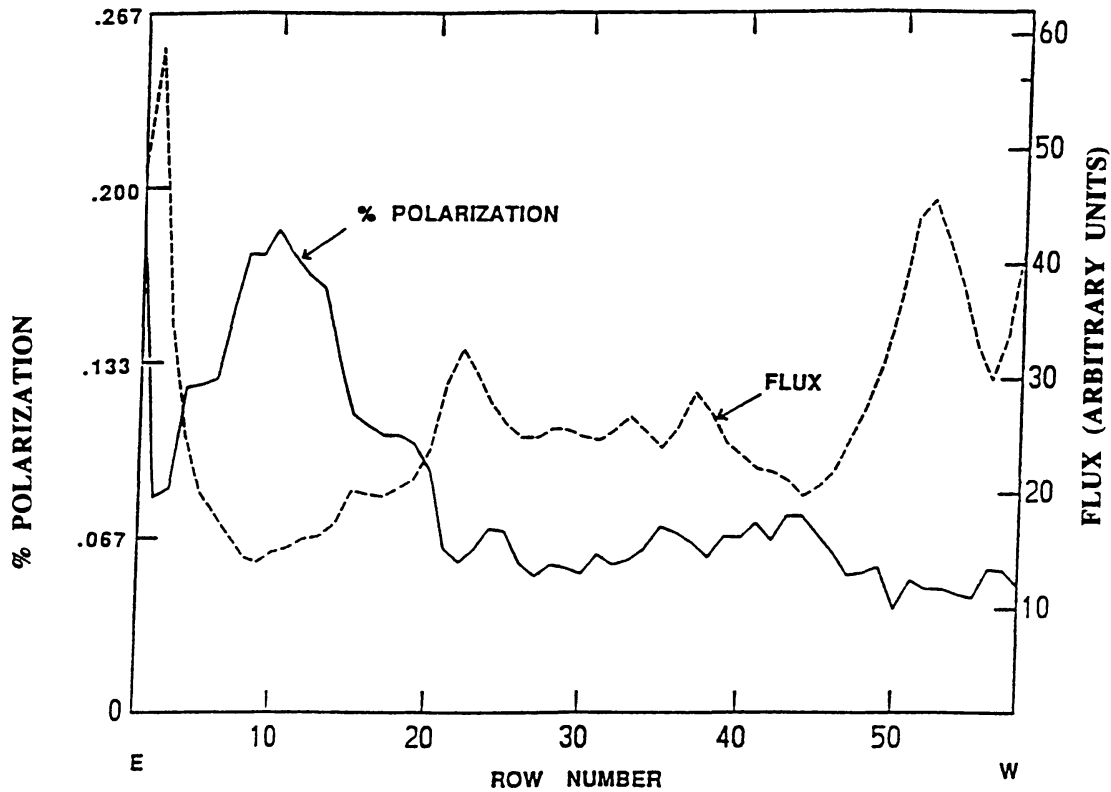


Fig 1. 2 μ m flux and polarization scans along the southern edge of the frame shown superposed on the galactic center images in Fig 2.

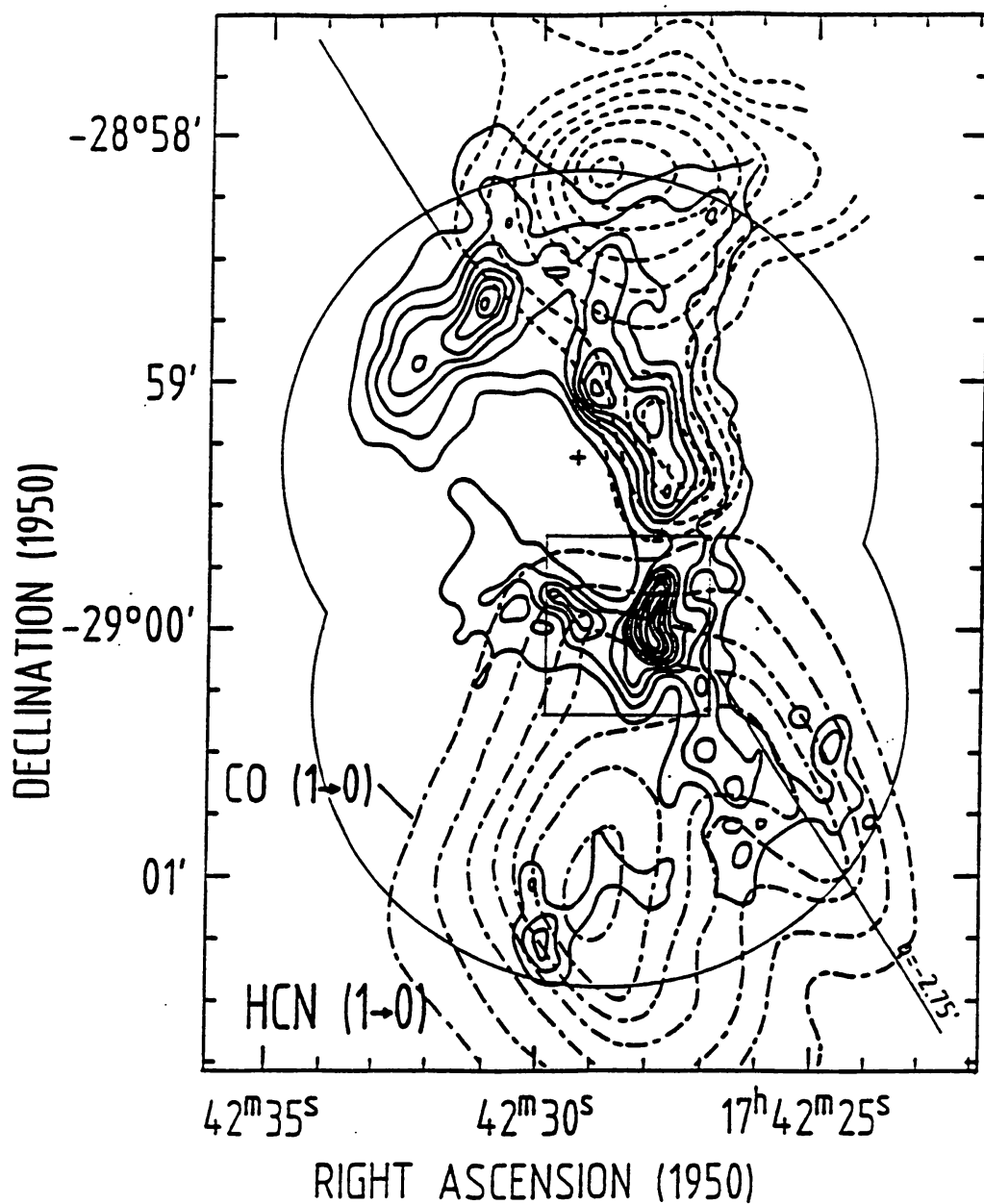


Fig 2. The box shows the location of the $2.2\mu\text{m}$ frame in which the region of anomalous polarization was discovered. The plus sign gives the position of the galactic center. The contours of HCN and CO emission are taken from Gusten *et al.*