STAR FORMATION IN NGC 5128

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Star formation in the dust lane of NGC 5128 (Cen A) has been studied using digitized CTIO 4m plates. The digital images were calibrated to the standard U, B and V passbands using photoelectric photometry (van den Bergh 1976). Ages for the dominant stellar component were derived by de-reddening each pixel along an R = 3.3 reddening law to its intercept with a theoretical cluster evolution track in the U-B, B-V plane (Davis 1979). The HII regions of Hodge and Kennicutt (1983) were used as tracers for the most recent star formation.

The dust lane of NGC 5128 is probably a tall, thin ring that is presently subject to infall from the IGM (Pennington 1984), rather than a disk-like structure, as had previously been assumed. The lane is orbiting from the SE to the NW at ~250 km/s. Recent star formation is not distributed evenly along the dust lane, with the SE part of the lane noticeably lacking in HII regions while the northern edge of the lane downstream from the infall point is the region most intensely undergoing star formation. This suggests that star formation is initiated near the infall region on the northern edge of the lane and dies out as the lane orbits around. The travel time from the infall region to the first of the major HII regions is 4×10^6 years and the orbit time is 5×10^7 years, assuming the galaxy is at 3 Mpc.

The northern edge of the lane was extracted from the rasters to examine the possibility of an age gradient downstream from the infall region as the newly formed HII regions age. A gradient was found with the average age increasing from log (age in years) = 7.18 to 7.33±0.07. This may be due to either an aging stellar population or to anomalous reddening as the NW end of the lane is approached. The absence of a similar gradient at the SE end of the lane and the magnitude of the gradient, ~1/4 orbit, suggests that this is an age gradient.

Although star formation is initially most intense on the northern edge of the lane, young stars become evenly distributed across the height of the lane is less than one orbit. Examination of the dust lane to the SE, where it orbits back around to the near side of the

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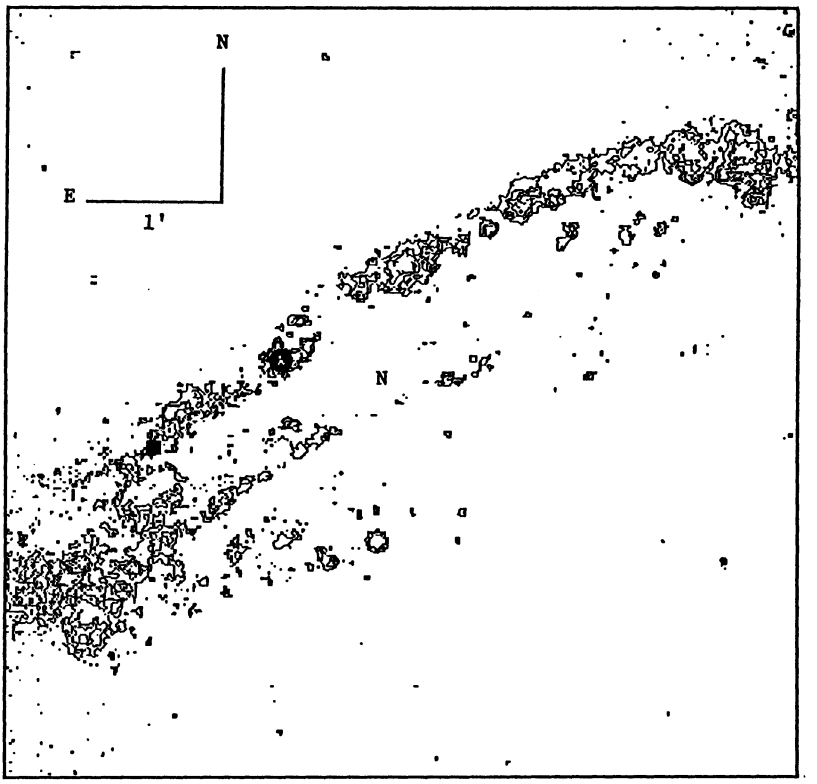

Figure - This is a contour map of NGC 5128 showing regions bluer than U-B = -0.20. The infall region is marked by a square east of the nucleus (N) and the first major HII region is marked by an open circle. The SE end of the lane is blue, but has few HII regions, unlike the northern rim, which is sharply defined both by its color and numerous HII regions.

galaxy, shows no age or U intensity gradient between the northern and southern edges. This is probably due to star formation spreading across the height of the lane rather than a dispersal of the young stars and HII regions. A dispersal would require that these young clusters move only to the south at velocities $\geq$20 km/sec. While this is possible if the lane is turbulent, it is not considered likely because many of the HII regions and young clusters that are present away from the northern edge appear to lie in chains that parallel the edges of the dust lane. This suggests a star formation mechanism that acts along the flow lines of the lane.

References

Davis, J.: Ph.D. Thesis, Rice University, 1979.
Hodge, P.W. and Kennicutt, R.C.: 1983, A.J. 88, 296.
Pennington, R.L.: 1984, Ph.D. Thesis, Rice University, 1984.
van den Bergh, S., 1976, Ap.J. 208, 673.

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