

RADIO CONTINUUM OBSERVATIONS OF NGC 1961: INTERACTION WITH THE INTERGALACTIC MEDIUM OR THE REMNANT OF A MERGER?

U. LISENFELD

Universidad de Granada, Spain

AND

P. ALEXANDER AND G. POOLEY

MRAO, Cavendish Laboratory, Cambridge, UK

We present new radio continuum images of the supermassive, peculiar galaxy NGC 1961 at 1.5, 4.9, 8.4 and 15 GHz. NGC 1961 (Arp 184) is a very massive (dynamical mass $> 10^{12} M_{\odot}$) Sb galaxy with a peculiar and asymmetric optical appearance. Furthermore, it exhibits an unusual, asymmetric HI distribution with an extensive wing of gas extending 30 kpc to the north-west and a sharp edge to the south-east (Shostak et al. 1982).

Our observations allow us to separate the thermal and the nonthermal radio emission and to determine the nonthermal spectral index distribution. This spectral index distribution in the galactic disk is unusual: at the maxima of the radio emission the synchrotron spectrum is very steep, indicating aged cosmic ray electrons. Away from the maxima the spectrum is much flatter. We discuss various possibilities to explain this peculiar behavior (for more details see Lisenfeld et al. 1998) and conclude that the most likely cause are variations of the star formation rate (SFR) in the past. The steep spectra of the synchrotron emission at the maxima indicate that a strong decline of the SFR has taken place at these sites. The extended radio emission is a sign of recent cosmic ray acceleration, probably by recent star formation. We suggest that a violent event in the past, most likely a collision with an intergalactic gas cloud or a merger, has caused the various unusual features of the galaxy.

References

- Lisenfeld, U., Alexander, P., Pooley, G.G., & Wilding, T. 1998, *MNRAS*, submitted
Shostak, G.S., Hummel, E., Shaver, P.A., van der Hulst, & J.M., van der Kruit, P.C.
1982, *A&A*, **115**, 293