We have some 32 \( \mu \)m data including a direct size estimate for Arp 220 of less than 3'.

In all of the eight cases in which we searched for a silicate feature using 10% bandwidth filters we found substantial absorption. None was as deep as that previously found in NGC4448, however.

40.05

Infrared observations of hotspots in the lobes of powerful radio galaxies.


We report results of the first detections of infrared emission from hotspots in the lobes of six powerful radio galaxies. When combined with data at other wavelengths (including also the first detections at 1.3\( \mu \)m) we have been able construct spectra for these objects over the frequency range \( 10^{7} \sim 10^{12} \)Hz with unprecedented accuracy, and have been able to obtain accurate measures of the cutoff frequencies. Five out of six of our sample (3C208, 3C33S, 3C115E, 3C123E and 3C273A) show a high-frequency cut-off \( \nu_{c} \lesssim 2 \times 10^{14} \)Hz. Pictor A, however, has a straight radio-to-optical power-law spectrum which may extend to X-ray frequencies. The spectral breaks are caused by synchrotron losses within the hotspot emission regions, and we identify two types of hotspot. High-loss hotspots (with break frequencies \( \nu_{b} \lesssim 10^{9} \)Hz) have long cylindrical emission regions with lengths comparable to the hotspot diameters. Low-loss hotspots (\( \nu_{b} \gtrsim 10^{9} \)Hz) are characterised by thin disk-like regions. Only low-loss hotspots are able to power bright radio lobe emission.

In order to derive self-consistent models of the hotspot emission, one needs mildly relativistic jet speeds 0.15c < \( \nu_{jet} < 0.5c \). Model fits to the data show that the typical low-frequency spectra are flat (\( \alpha = -0.5 \pm 0.1, \nu_{c} \propto \nu^{\alpha} \)). This is in perfect agreement with the spectra that would be expected from particle acceleration by a first-order Fermi mechanism at a strong shock.

40.06

Infrared Images of Very High Redshift Radio Galaxies

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Optical images sample the rest frame ultraviolet in very high redshift galaxies, which is presumably due to relatively small numbers of short lived massive stars. Infrared images are a better guide to the general stellar population in these galaxies, and are necessary to distinguish true primordial galaxies from those merely undergoing starbursts. We present \( K \) (2.2\( \mu \)m) images of distant radio galaxies obtained with the Infrared Imager (IRI) on the KPNO 4m telescope. These include some of the highest redshift galaxies known: 3C 297 (\( z = 2.474 \)), B2 0902+34 (\( z = 3.390 \)), and protogalaxy candidates 3C 294 (\( z = 1.786 \)) and 3C 236.1 (\( z = 1.815 \)). The IR images show a bewildering variety of forms, not predictable in general from their observed optical properties.

40.07

An Infrared Counterpart to a Low Latitude Highly Variable Radio Source

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We have identified a near-infrared bright counterpart to the highly variable, unresolved galactic plane radio source G0116+622 (Duric and Gregory, A., J., 85, 1149, 1988). This source is of particular interest as it has been suggested (Gregory et al., Nature, 323, 603, 1986) to be the counterpart of the 7.3\,\gamma\,source Cas 71. Our object, observed on six nights at Kitt Peak National Observatory in 1989 September, is located at \( \alpha = 01^h 16^m 01.24^s, \delta = +26^\circ 13^\prime 39.7^\prime\prime \), with estimated