

EXTRAGALACTIC MEGAMASER, STARBURST and MECHANISMS

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In a study based on the analysis of an IR colour-colour diagram (see Figure 1) of galactic nuclei associated with OH megamasers and water megamasers we conclude that:

1) OH megamaser galaxies are usually associated with galactic nuclei which are undergoing a burst of star formation. The colour temperatures of infrared emission are 50-80 K. The far-infrared spectra of OH megamaser galaxies are characterised by high excess in the 60 μm band over the 25 μm and 100 μm bands.

2) The known water megamaser galaxies are associated with two kinds of galactic nuclei which are characterised by starburst and disc components and starburst and Seyfert components respectively. The luminosities of far-infrared emission are much less than for OH megamasers. The colour temperatures of $T(100/60)$ are almost double the colour temperatures of $T(60/25)$. The infrared spectra have less excess in the 60 μm band than do OH megamasers.

3) We understand the mechanism of OH megamaser amplification in broad outline but not in detail. To make progress a programme of detailed calculations of OH populations must be initiated. In this manner we may be able to establish the nature of the environment in the maser zone and important properties of the parent galaxies. In particular we need to be able to reproduce observed line ratios in the 1667 and 1665 MHz main lines and to be able to show why 1667 MHz is strongly dominant. The nature of water megamasers remains obscure although observations do suggest that, as for OH megamasers, they operate through amplification of the background continuum emission.

Figure 1: Colour-Colour diagram of the galaxies of OH and water megamasers, and examples from Rowan-Robinson and Crawford (1989, *Mont. Not. R. Soc.* 238, 523); d1: "disc" galaxies, d2: "starburst" galaxies and d3: "Seyfert" galaxies.

