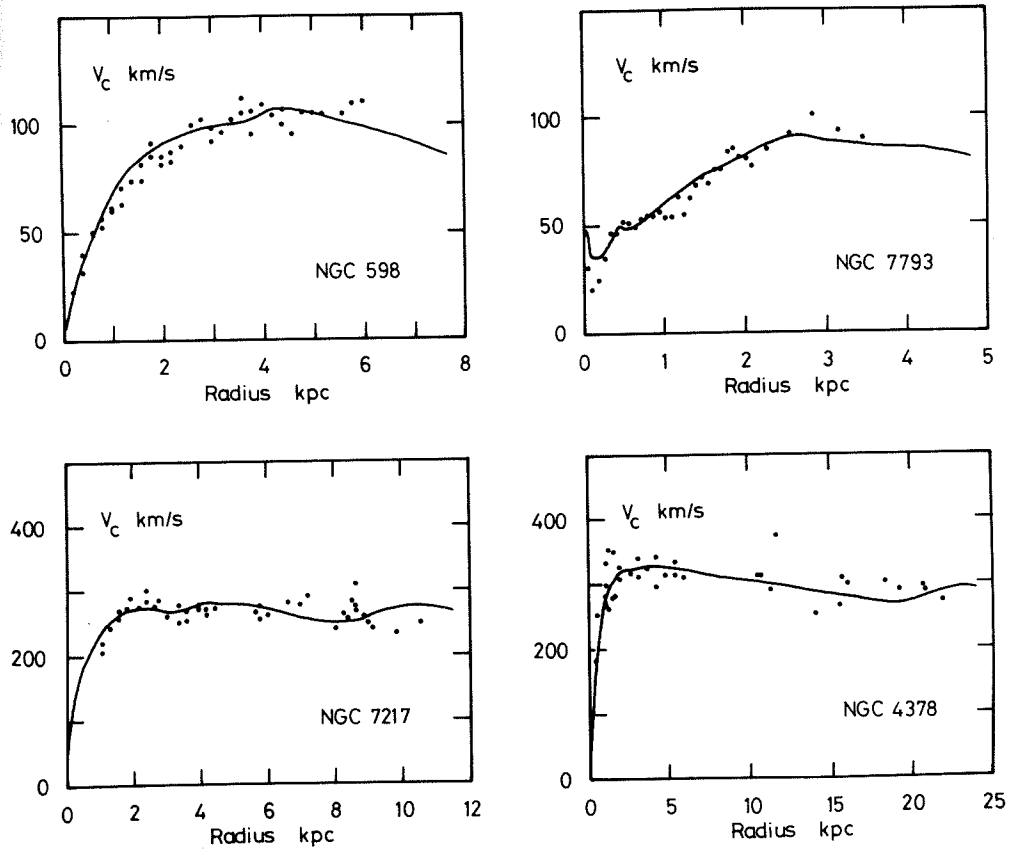
DISCUSSION

KALNAJS : The customary approach of deducing mass distribution from rotation curves involves an implicit or explicit extrapolation of the velocity data, and the often reported rise of M/L usually begins where the observed information runs out. I would like to show you a slide depicting four rotation curves computed from photometric data which has been converted into mass distributions by assuming that M/L is constant within a galaxy. The photometry extends to faint enough limits to completely determine the rotation curves. For NGC 4378 it was necessary to decompose the light into a bulge and a disk. For the others the decomposition gave essentially the same curves as would have been obtained from pure disks.
The rotation curves agree well with the observed velocity points, and thus demonstrate that the flat rotation curves of NGC 7217 and NGC 4378 need not lead one to conclude that there is dark matter in the outer parts of these galaxies.



Rotation curves computed from photometry assuming a constant M/L within each galaxy. The dots are the measured velocities. The values of M/L used are 5.0, 2.9, 4.2 and 6.5.

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..... : ?
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somebody : HA, HA, HA.
..... : ***, ???, !!!
(The audience becomes restive and the massive halo enthusiasts slowly regain their composure).

HAUD : This is very interesting, but note the limited extent of the rotation curves of these four galaxies. Three of them extend to radii less than 12 kpc and the fourth one reaches 25 kpc. Usually the M/L starts to increase rapidly only outside roughly 30 kpc, and only giant galaxies have coronas.

RUBIN (to Kalnajs) : It is true that the analysis of the rotation curves presents the mass interior to any R, but not the distribution of the mass. Thus, while the mass could be in a disk, there are other reasons, stability especially, that suggest a halo. The velocities you show for NGC 4378 and 7217 come from our data, and both rotation curves are fairly exceptional in that the velocities fall slightly with increasing R. I suspect you would have more difficulty in fitting with constant M/L a flat or slightly rising rotation curve which extends to very large radii. In any case, it seems to me, you must be saying that the surface brightness of these galaxies falls slower than exponentially with increasing R.

GOTTESMAN : As a contrast to Dr Haud's presentation, I would like to offer the barred spiral NGC 3992. The HI in this system has been well-observed at the VLA. This data allows a mass to be determined within a radial distance of 15 - 20 kpc. There are also three satellites whose atomic hydrogen emission has been detected. Following the method of Bahcall and Tremaine one can use the satellites to calculate a mass within $\sim$ 60 kpc of NGC 3992. Within the errors, the two masses calculated are the same ($\sim 2\ 10^{11}\ M_{\odot}$).
One can also invert the argument. If NGC 3992 had an isothermal halo, the expected velocities of the satellites would be 3-4 times greater than observed values. Jim Hunter and I have therefore concluded that there is little or no room for a massive halo 10 times greater than the disk mass. The problem then remains to explain the observed flat rotation curve.

HAUD : I think that a mass calculated from three satellites only may have large statistical errors.