X-RAY CLUSTERS OF GALAXIES: WHAT TO PLOT AGAINST X-RAY LUMINOSITIES?

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A new updated list of clusters of galaxies found within x-ray error boxes is presented. Since the last published list (Vidal 1975) four new clusters A478, A2142, A2255 and an anonymous cluster were found within 3U0405+10, 3U1555+27, 3U1639+40 and MX1329-31, respectively. This extensive list is used to look for phenomenological correlations between x-ray luminosities and other physical cluster parameters. We analysed 3 such correlations: (a) The x-ray luminosity-velocity dispersion diagram is presented using newly determined velocity dispersions in the clusters A1060 (Vidal & Peterson 1975), A1367 (Tifft & Tarenghi 1975) and the Centaurus cluster (Vidal & Wickramasinghe 1976). First, it is shown (Yahil & Vidal 1976) that the observed velocity distribution of galaxies in clusters in general is consistent with a gaussian and, therefore, the standard deviation of the distribution can be used as a good statistical measure for the velocity dispersion. But, inspecting the Lx-ΔV diagram, it is shown that a linear relationship between these parameters is not compelling yet. Furthermore the slope of such an assumed linear relationship is relying too much on the isolated Perseus point. Consequently the velocity distribution in the Perseus cluster is critically analysed. (b) The plot of x-ray luminosity versus Rood & Sastry morphological cluster type is redrawn using all discovered x-ray clusters. It is found that clusters containing cD or binary galaxies have always high x-ray luminosities, but that all other morphological types (L-C-F-I) have a wider range than previously thought, even beyond $Lx \approx 10^{44}$ erg s^{-1}. (c) The radio spectral indices at low frequencies are plotted against Lx (Vidal 1975). It shows not only that high x-ray luminosities clusters have steeper radio spectra, but that there may exist a smooth correlation between these 2 parameters. This plot strongly supports the thermal intergalactic bremsstrahlung model in which the thermal pressure of such a medium will slow down the radio source expansion (van den Bergh 1976). This will increase the lifetime of the radio source until enough high energy electrons will lose energy through synchrotron radiation. Thus the steep radio spectral index will show a deficiency of high energy electrons relative to the lower energy ones, as is actually observed.

REFERENCES

Dickens, R.J. & Moss, C., 1976. Mon.Not.R.astr.Soc., 174,47.
Rood, H.J. & Sastry, G.N., 1971. P.A.S.P., 83,313.
Tifft, W.G. & Tarenghi, M., 1975. Astrophys.J.Lett., 198,L7.
van den Bergh, S., 1976 (to be published in Vistas in Astronomy).
Vidal, N.V., 1975. Proc.Astron.Soc.Australia, 2,327.
Vidal, N.V. & Peterson, B.A., 1975. Astrophys.J.Lett., 196,L95.
Vidal, N.V. & Wickramasinghe, D.T., 1976 (to be published).
Yahil, A. & Vidal, N.V., 1976 (to be published).

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