Rev. Mexicana Astron. Astrof. 12, 74 (1986)

THE RELATIVE MOTION OF THE LOCAL GROUP OF GALAXIES TOWARDS THE VIRGO CLUSTER

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SUMMARY. We derive a peculiar Virgocentric velocity V_p=200±50km s^{-1} from a sample of 67 E-galaxies members of groups and clusters, with radial velocities in the range 1000-7000 km s^{-1}.

I. INTRODUCTION

In the present work we give an estimate of the peculiar Virgocentric velocity, using as a distance indicator the luminosity-effective radius relationship for E-galaxies. Our sample constitutes of 67 "bona fide" E-galaxies members of groups and nearby clusters. Such a sample was prepared on the basis of several requirements: to ensure a reasonable sky coverage; the groups should have velocities higher than 1000 km s^{-1}, be located far away from the Virgocluster (so that their motions were not seriously influenced by the gravitational potential of the cluster) and have magnitudes and angular effective radius in the Second Reference Catalogue of Galaxies.

Our analysis was based on the possibility of detecting statistically a motion of the Local Group towards the Virgo cluster, with respect to a backdrop of galaxies whose motions are not supposed to be seriously influenced by the gravitational attraction of the Virgo cluster itself.

From our analysis we derive a peculiar Virgocentric velocity of 200 ± 50 km s^{-1}, which is consistent with a recent result by Dressler (1984) derived by an independent method.

II. DISCUSSIONS

In order to verify the reality and the uncertainties involved in our calculations, we have performed Monte Carlo experiments. Series of bogus data sets were simulated with the same number of objects as our original sample. The input peculiar velocity in our experiments was always recovered within an uncertainty of about 50 km s^{-1}, but this value may be as large as 120 km s^{-1} if we simply add the considered random velocity directly to the E-galaxies without performing any group average as our method implies. On the other hand, we emphasize that large errors due to the possible presence of systematic effects in our procedure or in our data sample cannot be excluded.

Our peculiar Virgocentric velocity implies, within the framework of the linear theory, the density parameter to be in the range

$$0.042 \leq \Omega \leq 0.085$$

if we adopt a density enhancement $\delta = 2.7$ and a Hubble velocity towards Virgo equal to 967 km s^{-1} (Yahil, 1981; Kraan-Korteweg, 1981). A full version of this work will appear elsewhere

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