ABSTRACT

The Large Scale Structure
Of The Universe

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There is no model for the large scale structure of the Universe that adequately describes all the features. In light of this, a new model is proposed in which 11 eV neutrinos constitute the dark matter in a Universe with a centre. It yields an open Universe.

By virtue of the neutrinos possessing a limiting speed, expansion of the spacetime continuum at speeds greater than this, causes the formation of cavitations, alternating with shells of matter. A periodicity of $134h^{-1}$Mpc is obtained between overdensities in galaxy distribution which is in very good agreement with the observed periodicity of $128h^{-1}$Mpc. Fractional collapse of the shells leads to formation of density perturbations in a natural way producing overdensities and underdensitites. The underdensities form clusters by a redshift of 16. The underdensities act as seeds for the formation of voids. Spherical voids of 20Mpc diameter are obtained with ridges, which fragment to produce superclusters at a redshift of 4. Expansion of voids gives rise to peculiar velocities of $473kms^{-1}$. The intergalactic medium is produced from regions of critical densities. The central region in this model, being spherical, collapses to form an extra super-massive black hole of mass 2.7×10^{17} $M_\odot$. Matter, becoming heated as it falls onto the black hole can explain the diffuse hard x-ray and gamma-ray background. It also offers a suggestion for the heating of the intergalactic medium.

An updated catalogue of voids was compiled in order to match model predictions to observations. Statistical analyses performed on the catalogue show voids to be distributed fairly homogeneously in the northern and southern galactic hemispheres. Northern hemispheres constituted 65% of the voids. Furthermore, voids of larger volumes were found at

greater distances, which is possibly an observational effect.

The clustering of voids was examined using a dendrogram analysis. Several clusters were identified in the northern galactic hemisphere, containing an average of 20 members, the average characteristic clustering length was 59 Mpc. Clustering of voids can be explained within the context of our model.