Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Turbulence and the formation of galaxies CARL H. GIBSON, University of California at San Diego — Gravitational structure formation in the universe began by fragmentation of the primordial plasma at points of minimum density and maximum rate-of-strain when the largest Schwarz gravitational instability scale matched the scale of causal connection ct, where c is the speed of light and t is the time since the big bang. Observations and theory suggest this occurred soon after transition to weak turbulence at about $t = 10^{12}$ s, forming proto-supercluster-voids and proto-superclusters of plasma mass 10^{45} kg along turbulent vortex lines (http://lanl.gov/astro-ph/0606073). The most massive fluid component (probably neutrinos) filled the voids by diffusion and did not form non-baryonic (cold) dark matter condensates, contrary to the standard model. As the universe expanded and cooled the fragmentation mass decreased to that of galaxies 10^{42} kg. Hubble space telescope images show the earliest galaxies have a linear morphology reflecting vortex lines of the primordial plasma turbulence. The viscosity decreased by 10^{13} at time $t = 10^{13}$ s when the plasma turned to gas, permitting fragmentation at planetary 10^{24} kg and proto-globular-star-cluster (PGC) 10^{36} kg masses to form the baryonic dark matter. Only about 3% of these frozen H-He planets have formed stars. The frozen PGCs diffused to form 10^{22} m halos surrounding 4×10^{19} m luminous fossils of the original proto-galaxies and the turbulence that set this scale.

Carl H. Gibson
University of California at San Diego

Date submitted: 31 Jul 2006 Electronic form version 1.4