Explosions in pancake models of galaxy formation

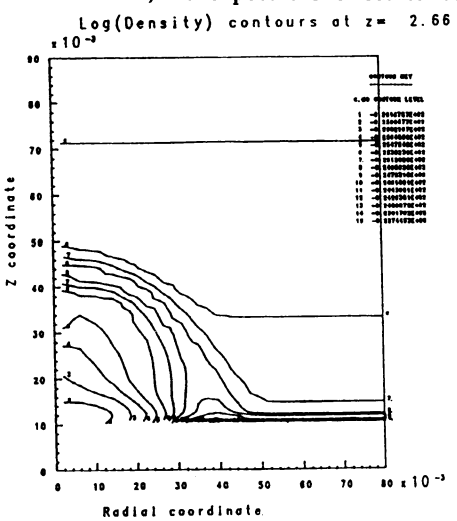
J.G. More and A.F. Heavens
Department of Astronomy, University of Edinburgh, EH9 3HJ, U.K.
M.J. Wilson
Department of Applied Mathematical Studies, University of Leeds, U.K.
& A.S. Trew
Department of Physics, University of Edinburgh, Edinburgh, U.K.

We have investigated the consequences of galaxies in pancakes releasing large quantities of energy, in the spirit of explosion models.

The explosion sends a blast wave through the baryonic material which is still falling in towards the pancake plane. Some of the shocked gas can cool, leading to a population of galaxies outside the pancake planes, reducing the strength of galaxy clustering. The large-scale structures (tens of Mpc) comes from the original pancake distribution.

We use a fluid-in-cell scheme, running on a 64x64 axisymmetric, comoving grid, with logarithmic grid spacings the highest resolution is where the density gradients are most severe. For speed, we use the University of Edinburgh Physics Department Distributed Array Processors.

In neutrino models, gas can cool, while not violating the X-ray background and Sunyaev-Zeldovich constraints, if the energy escaping into the infalling pancake is less than about 10^{52} J. However, the cooled gas does not extend very far away from the pancake plane (<1 Mpc), so the large-scale distribution should not be affected. For baryon-dominated universes, we expect the effect to be much more important.



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