

Edited by Emma Sanders

Millennium 'delayed' by space mission to Saturn

Hold the champagne! Millennium celebrations throughout the world will be delayed. The culprit is the Cassini-Huygens space mission, which flew by the Earth in August in order to pick up speed for its outward journey to Saturn. The energy gained by Cassini was lost by the Earth, thus slowing down its orbital motion. However, astronomers shouldn't be criticized as party poopers – celebrations will only have to wait an extra million millionth of a second.

Cosmology not constant

A simulation of the evolution of the universe suggests that it is expanding at an accelerating rate. This is more evidence for the existence of Einstein's cosmological constant – a kind of gravitational pressure in space that acts against the attraction due to mass.

Last year the Virgo consortium carried out the largest computer simulation ever, modelling the evolution of some 1 billion particles. The consortium groups astronomers from Canada, Germany, the UK and the US and it is led by Carlos Frenk at Durham University in the UK.

The Durham group has now used the Virgo simulation to explain observations of real galaxies. It used models of galaxy formation together with the distribution of matter predicted by the simulation.

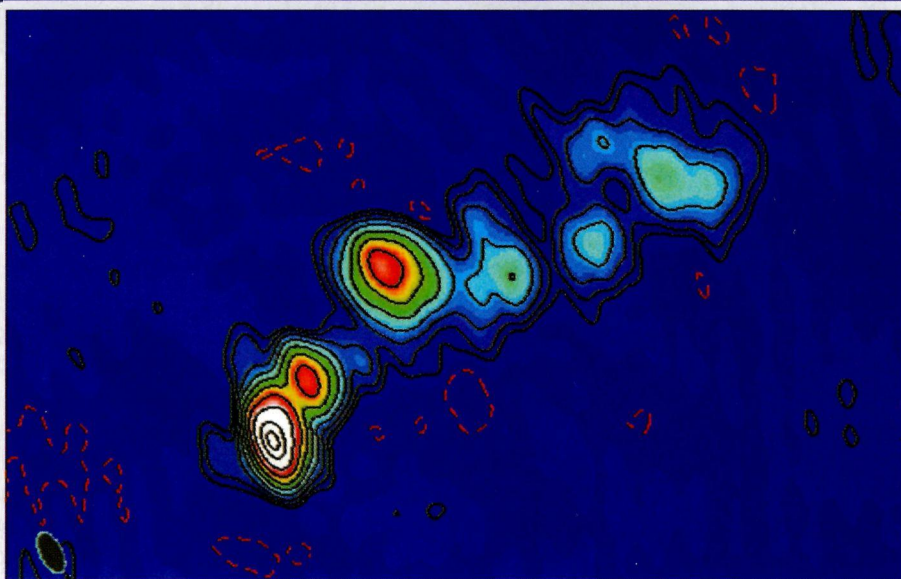
"This is the first time that we have had a

theory that matches the observed distribution of clustering", said Frenk. "Its amazing. I couldn't believe it when I first saw it!" However, to get a perfect match, they needed to use a non-zero cosmological constant.

This is not the first time that observations have implied the existence of a cosmological constant. Supernova studies (*CERN Courier* May p9) have also hinted at this and Frenk says that his results are "beautifully consistent". The group is trying to test its result by carrying out an additional simulation in parallel, this time including both dark matter and gas. First indications are in agreement, but there is a greater margin of error.

The Virgo supercomputer simulations were carried out at the Max-Planck centre in Garching, Germany, and the Edinburgh computer centre in the UK.

Picture of the month



This radio map shows the nucleus of the quasar 3C380 (left), with emission from a huge jet 240 light years across blasting out into space to the right. Quasars are galaxies with supermassive black holes at their centre. Radio emission is caused by synchrotron radiation from electrons moving close to the speed of light along the huge magnetic fields produced by the black hole. 3C380 is the first radio source processed with the new European Very Long Baseline Interferometry (VLBI) Network Processor which was commissioned this summer. VLBI observations use up to 16 radiotelescopes simultaneously at different sites around the world. The data are then combined to simulate one enormous telescope, giving the highest resolution available in astronomy. (JIVE.)

FUSE lift-off

A new satellite to explore the ultraviolet universe – the Far Ultraviolet Spectroscopic Explorer (FUSE) – was launched on 24 June. It will investigate the origin and evolution of the lightest elements – hydrogen and deuterium.

Deuterium is a valuable indicator of what happened in the early universe, because its formation depended on the temperature and density at that time. The amount of deuterium has been decreasing ever since because it is recycled by nuclear fission in stars. A measure of the relative abundance of hydrogen and deuterium can reveal valuable information about the conditions just a few seconds after the Big Bang.

FUSE will also be used to observe the composition of interstellar gas and the chemical evolution of galaxies. The satellite will observe the far-ultraviolet spectrum from 90 to 120 nm with more than 10 000 times the sensitivity previously attainable.

FUSE was built by collaborators in France, Canada and the US and is part of the NASA Origins programme. Future Origins telescopes include the successor to the Hubble – the Next Generation Space Telescope, currently programmed for launch in 2006.