

# Alternative Cosmology Group Newsletter - October 2007

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## More openness on Big Bang problems?

In what is perhaps a sign that popular science journals are becoming more open to talking about the problems of conventional cosmology, American Scientist has published in its September-October issue a critique of the Big Bang by Dr. Michael Disney (<http://www.americanscientist.org/template/AssetDetail/assetid/55839>). American Scientist is the publication of Sigma Chi, the US scientific research society, and is aimed at a general audience. The article, forthrightly titled "Modern Cosmology, Science or Folk-tale" demonstrates that at all points in its history the Big Bang model has had more independent adjustable parameters than observable data points, giving it almost no powers of prediction, the key characteristic of scientific theories. Dr. Disney participated in the first Crisis in Cosmology Conference.

## A new galaxy catalog

Galaxy surveys with better and better telescopes have become one of the key ways of learning about the universe and testing cosmological models. In recent years, the Hubble Ultra Deep Field, with ultra-long exposures and Hubble's 0.03 arcsecond resolution has become a major tool in cosmology. However the HUDF covers a very tiny portion of the sky, 11 square arc minutes, so there is always the question of whether conclusions drawn from it are universally valid. Now a new catalog is available based on the much larger COSMO field, which is 0.7 square degrees, 230 times large than HUDF. The catalog with 290,000 galaxies stretches out to a redshift of 6, so allows much comparison with HUDF. However, one limitation is that it is a ground-based catalog, so lacks HUDF's high resolution. Typically seeing-limited resolution is around 1 arcsecond, similar to that of any uncorrected ground-based telescope.

A deep I-selected multi-waveband galaxy catalogue in the COSMOS field

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<http://arxiv.org/abs/0710.5244v1>

## MOND theory and observations

There are three new papers on modified Newtonian gravity or MOND. MOND has been proposed as an alternative to dark matter in explaining many observed phenomenon, and hypothesizes that gravity deviates from the Newtonian (and general relativity) models at low accelerations.

Dr. Halle examines the theoretical consequences of modifying gravity in the way MOND proposes, showing that in certain cases, the principle of equivalence, that equates gravitational and inertial mass, no longer applies.

Around MOND: Lagrangians, Hubble Equations, Perturbations and External Field Effect

Authors: Anaëlle Halle (ENS and St Andrews)

<http://arxiv.org/abs/0710.3898v1>

Moffat and Toth examine an even more curious characteristic of MOND. In Newtonian Gravity and General relativity, the force on a mass inside a spherically symmetrical array of masses is zero, but in MOND theory this is not true. Moffat and Toth calculate that, given certain assumptions, the force on an accelerate particle just equals the particle acceleration times it's mass. In other words, these force explain, in their view, the existence of inertial mass. However for very small accelerations, they predicted the inertial mass becomes 4/3 the value determined from Newton's first laws. They proposed an experimental test of this prediction involving accelerations equivalent to accelerating to the speed of light over a Hubble time, around  $7 \times 10^{-8} \text{ cm/sec}^2$ .

Modified gravity and the origin of inertia

Authors: J. W. Moffat, V. T. Toth

<http://arxiv.org/abs/0710.3415v1>

In a final MOND paper, Tiret et al use observations of small galaxy satellites of large elliptical galaxies to argue that MOND can better explain the distribution of satellite velocities than can dark matter.

Velocity dispersion around elliptical in MOND

Authors: O. Tiret (1), F. Combes (1), G.W. Angus (2), B. Famaey (3), H.S. Zhao (2) ((1) LERMA-Observatoire de Paris, (2) University of St. Andrews, (3) Universite Libre de Bruxelles)

<http://arxiv.org/abs/0710.4070v1>