

Alternative Cosmology Group Newsletter - January 2008

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Editor's Note: This newsletter covers papers from December, 2007, but from now on we are calling the newsletters by their date of publication, making this the January, 2008 edition.

WMAP Non-Gaussianity, continued

One of the strongest predictions of the dominant, inflationary Big Bang theory is that the radiation from the Cosmic Microwave background (CMB) is distributed randomly across the sky. The small fluctuations in intensity in this radiation should be described by a Gaussian distribution, the standard distribution of a random process. But for two years paper after paper has found that these predictions are contradicted in many different ways. The CMB locations are not Gaussian—there are too many “hot” or “cold” zones, and the zones are not dispersed randomly on the sky, but align in certain directions.

One response to this data has been to attempt to somehow minimize the difference between theory and prediction, for example by arguing that, except for one very big cold spot, the rest of the sky is truly random. A new paper by Pave Naselsky et al refutes that argument, showing that there are many hot and cold spots and confirming that, on scales of 5- 10 degrees on the sky, the CMB is clearly non-Gaussian.

In almost all fields of science, the clear contradiction of such a key prediction of a theory would cause its rejection. Unfortunately, this is not the process in current cosmology. Instead, the reaction is to supplement a failed theory with new, hypothetical entities to fit the new observations. The paper by Yadav and Wandelt is an illustration of this tendency. They, too, confirm that the CMB as mapped by the WMAP satellites, is non-Gaussian. But from this they conclude, not that the inflationary theory is wrong, but only that it is too simple and that more “exotic theories” with “multiple scalar fields, features in inflation potential, non-adiabatic fluctuations, non-canonical kinetic terms, deviations from the Bunch-Davies vacuum” will be needed.

The dominant cosmology thus continues its evolution to an increasingly Rococo collection of unsupported hypothetical entities, a theory with less and less predictive power.

The mystery of the WMAP cold spot

Authors: Pave D. Naselsky (1), Per Rex Christensen (1), Peter Coles (2), Oleg Verkhodanov (3), Dmitry Novikov (4,5), Jaiseung Kim (1) ((1) Niels Bohr Institute, Copenhagen, Denmark; (2) School of Physics and Astronomy, Cardiff University, Wales, United Kingdom; (3) Special astrophysical observatory, Nizhnij Arkhyz, Russia; (4) Imperial College, London, United Kingdom; (5) AstroSpace Center of Lebedev Physical Institute, Moscow, Russia)

<http://arxiv.org/abs/0712.1118v1>

Detection of primordial non-Gaussianity (fNL) in the WMAP 3-year data at above 99.5% confidence

Authors: Amit P. S. Yadav, Benjamin D. Wandelt

<http://arxiv.org/abs/0712.1148v2>

MOND Theory

One alternative to dark matter is Modified Newtonian Dynamics, or MOND, a theory of gravitation that is different from both Newtonian gravity and General Relativity. Moffat and Toth present in a new paper an effort to derive the equations of MOND from fundamental principles. They claim a good agreement between the theory's predictions and the rotation curves of galaxies.

Fundamental parameter-free solutions in Modified Gravity

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

<http://arxiv.org/abs/0712.1796v2>