The Alternative Cosmology Group Newsletter – February 2010

The ACG newsletter is distributed gratis to subscribers. Get onto our mailing list without obligation at www.cosmology.info/newsletter. The current newsletter is a review of 1024 papers published on arXiv under astro-ph, together with 486 under gen-phys, for the month of January, 2010. We now include papers archived elsewhere, provided access is full and open. The Alternative Cosmology Group draws its mandate from the open letter published in *New Scientist*, 2004 (www.cosmologystatement.org), and this newsletter seeks to publicise recently published empirical results that are aligned with that ethos. We prefer observational results and tend to avoid complete cosmologies and purely theoretical work. Discussion of method is welcome. If you would like to suggest recently published or archived papers for inclusion, please send the arXiv, viXra or other direct reference and a brief exposition to Hilton Ratcliffe (hilton@hiltonratcliffe.com). Note that our spam filter rejects slash and colon in the text, so please write web addresses commencing "www".

With great sadness and sense of loss we announce the passing on 26th January 2010 of a stalwart in non-aligned astrophysics and astrochemistry, Professor Geoffrey Burbidge. This comes barely a year after the passing of our colleague and friend, Tom Van Flandern. Geoff's impact in the field was enormous: One "B" of the iconic and definitive B^2FH paper defining stellar nucleosynthesis (Burbidge, Burbidge, Fowler, and Hoyle 1957, *Synthesis of the Elements in Stars*, Rev. Mod. Phys. 29, 547), he went on to develop the Quasi Steady State Theory with Fred Hoyle and Jayant Narlikar (F. Hoyle, G. Burbidge, and J. V. Narlikar, 2000, *A Different Approach to Cosmology*, Cambridge University Press). Our sincere condolences go to his wife Margaret and the rest of their family.

This month, we welcome a new resource to that rarefied list of publications that have the editorial courage and integrity to publish results that are wholly or partially non-aligned with the standard models: The Journal of Cosmology. It is peer-reviewed to a high standard, and having been through the process myself, I can vouch for their thoroughness. This is vitally important insofar as establishing respectability in the mainstream is concerned, and J. Cosmology may turn out to be an invaluable interface between orthodox and heterodox interpretations in a field where opponents usually talk past each other. Here is the link to the contents page of the January 2010 edition:
http://journalofcosmology.com/Contents4.html

Method

Tim Eastman has contributed regularly to the literature on method in scientific investigation. Here is his latest publication, in the *Journal of Cosmology*:

http://journalofcosmology.com/Multiverse5.html

Title: Cosmic Agnosticism, Revisited

Author: Tim Eastman

"Deep pencil beam surveys (<1 deg^2) are of fundamental importance for studying the high-redshift universe. However, inferences about galaxy population properties are in practice limited by 'cosmic variance'. This is the uncertainty in observational estimates of the number density of galaxies arising from the underlying large-scale density fluctuations. This source of uncertainty can be significant, especially for surveys which cover only small areas and for massive high-redshift galaxies … This implies that cosmic variance is a significant source of uncertainty at z=2 for small fields and massive galaxies, while for larger fields and intermediate mass galaxies cosmic variance is less serious."

[301] arXiv:1001.1737

Title: A Cosmic Variance Cookbook

Authors: Benjamin P. Moster, Rachel S. Somerville, Jeffrey A. Newman, Hans-Walter Rix

Perhaps the single most important question in cosmology is that of universal expansion. Although we tend to avoid pure theory in this newsletter, in trying to understand the concept and motivation for expansion it is unavoidable. *"The purpose of the paper is five-fold: (a) Argue that the question in the title can be presented in a meaningful manner and that it requires an answer. (b) Discuss the conventional answers and explain why they are unsatisfactory. (c) Suggest that a key ingredient in the answer could be the instability arising due to the `wrong' sign in the Hilbert action for the kinetic energy term corresponding to expansion factor. (d) Describe how this idea connects up with another peculiar feature of our universe, viz. it spontaneously became more and more classical in the course of evolution. (e) Provide a speculative but plausible scenario, based on the thermodynamic perspective of gravity, in which one has the hope for relating the thermodynamic and cosmological arrows of time."*

[957] arXiv:1001.3380

Title: Why Does the Universe Expand ?

Authors: T. Padmanabhan

Amadeo Balbi has produced a telling summary of the inherent limitations of cosmology, echoing this editor's view and those expressed by Mike Disney and Jean-Claude Pecker that cosmology is intrinsically fraught with uncertainty, to such an extent that a complete model consistent with all observation seems impossible. *"What can we know about the universe? I outline a*

few of the fundamental limitations that are posed to our understanding of the cosmos, such as the existence of horizons, the fact that we occupy a specific place in space and time, the possible presence of dark components, the absence of a reliable physical framework to interpret the behaviour of the very early universe."

[961] arXiv:1001.4016

Title: The limits of cosmology

Authors: Amedeo Balbi

Antonio Alfonso-Faus (who presented a paper on mass-boom at CCC1) derives a novel treatment of expansion at quantum-mechanical level, and finds for a static Universe. *"From the constancy of the Rydberg constant the Compton wavelength, h/mc, is then a true constant and consequently there is no expansion at the quantum mechanical level. The momentum mc is also a true constant and then general relativity predicts that the universe is not expanding, as shown elsewhere. The time variation of the speed of light explains the observed Hubble red shift. And there is a mass-boom effect. From this a coherent cosmological system of constant units can be defined."*

[109] gen-phys arXiv:1001.1561

Title: Non-expanding universe: a cosmological system of units

Authors: Antonio Alfonso-Faus

Nucleosynthesis

The title of this paper carries the intriguing phrase, *"…evidence for non-standard big bang nucleosynthesis."*

[715] arXiv:1001.4440

Title: The primordial abundance of 4He: evidence for non-standard big bang nucleosynthesis

Authors: Y. I. Izotov T. X. Thuan

Distance ladder/redshift

Much of the Standard Model of Cosmology depends upon the Hubble law, yet there is copious observational evidence tending to refute a definitive relationship between redshift and distance or velocity.

http://journalofcosmology.com/Multiverse10.html

Title: Anomalous Redshift data and the Myth of Cosmological Distance

Author: Hilton Ratcliffe

This important contribution by George Ellis addresses ongoing uncertainties in astrophysical measurement—the bound limits of gravitational systems like the Solar System, with extrapolation to ever larger systems until it finally confronts the theoretical boundary between expanding and non-expanding space in L-CDM cosmology. *"We emphasize how small a region*

the perturbations which became our Galaxy occupied, relative to the observable universe -- even relative to the smallest-scale perturbations detectable in the cosmic microwave background radiation. Finally, looking to the future of our cosmic domain, we suggest simple dynamical criteria for determining the present domain of influence and the future matter horizon. The former is the radial distance at which our local region is just now separating from the cosmic expansion. The latter represents the limits of growth of the matter horizon in the far future."

[744] arXiv:1001.4572

Title: The Evolution of Our Local Cosmic Domain: Effective Causal Limits

Authors: G. F. R. Ellis, W. R. Stoeger

Galaxy collisions

"We have used the GALEX ultraviolet telescope to study stellar populations and star formation morphology in a well-defined sample of 42 nearby optically-selected pre-merger interacting galaxy pairs. Galaxy interactions were likely far more common in the early Universe than in the present, thus our study provides a nearby well-resolved comparison sample for high redshift studies."

[179] arXiv:1001.0989

Title: Spirals, Bridges, and Tails: A GALEX UV Atlas of Interacting Galaxies

Authors: Beverly J. Smith Mark L. Giroux Curtis Struck Mark Hancock Sabrina Hurlock

Fractals

"For over half a century the Big Bang model of the Universe has provided an adequate explanation for the basic cosmological observations: a global expansion, an approximately uniform background of microwave radiation and a unique set of atomic element abundances. However, there were some technical problems with this model, such as an acausal beginning of spacetime, an unexpected failure to observe magnetic monopoles, a surprisingly high degree of large-scale uniformity, and an enigmatic knife-edge balance between open (infinite) and closed (finite) states."

[198] gen-phys arXiv:1001.2865

Title: An Infinite Fractal Cosmos

Authors: Robert L. Oldershaw

Lensing and evolution

"Lambda cold dark matter paradigm predicts that galaxy clusters follow an universal mass density profile and fit a well defined mass-concentration relation, with lensing clusters being preferentially triaxial haloes elongated along the line of sight. Oddly, recent strong and weak lensing analyses of clusters with a large Einstein radius suggested those haloes to be highly over-concentrated. Here, we investigate what intrinsic shape and orientation an halo should have to account for both

theoretical predictions and observations … We distinguished two groups. The first one (nearly one half) seems to be composed of outliers of the mass-concentration relation, which they would fit only if they were characterised by a filamentary structure extremely elongated along the line of sight, that is not plausible considering standard scenarios of structure formations. The second sample supports expectations of N-body simulations which prefer mildly triaxial lensing clusters with a strong orientation bias."

[294] arXiv:1001.1696

Title: On the over-concentration problem of strong lensing clusters

Authors: M. Sereno Ph. Jetzer, M. Lubini

Lensing and Dark Matter

The imposition of a dominant role for non-baryonic matter in cosmological modelling allows the application of techniques that would otherwise have been challenged by observation. Empirical constraints on the model are significantly diluted by tuneable parameters like Dark Matter. *"We review progress in understanding dark matter by astrophysics, and particularly via the effect of gravitational lensing. Evidence from many different directions now implies that five sixths of the material content of the universe is in this mysterious form, separate from and beyond the ordinary "baryonic" particles in the standard model of particle physics. Dark matter appears not to interact via the electromagnetic force, and therefore neither emits nor reflects light. However, it definitely does interact via gravity, and has played the most important role in shaping the Universe on large scales. The most successful technique with which to investigate it has so far been gravitational lensing. The curvature of space-time near any gravitating mass (including dark matter) deflects passing rays of light - observably shifting, distorting and magnifying the images of background galaxies. Measurements of such effects currently provide constraints on the mean density of dark matter, and its density relative to baryonic matter; the size and mass of individual dark matter particles; and its cross section under various fundamental forces."*

[303] arXiv:1001.1739

Title: The dark matter of gravitational lensing

Authors: Richard Massey, Thomas Kitching, Johan Richard

When Dark Energy is added to the recipe, it becomes almost farcical; both attraction and repulsion are tuneable to contrive a fit. *"Weak gravitational lensing is rapidly becoming one of the principal probes of dark matter and dark energy in the universe. In this brief review we outline how weak lensing helps determine the structure of dark matter halos, measure the expansion rate of the universe, and distinguish between modified gravity and dark energy explanations for the acceleration of the universe. We also discuss requirements on the control of systematic errors so that the systematics do not appreciably degrade the power of weak lensing as a cosmological probe."*

[313] arXiv:1001.1758

Title: Weak lensing, dark matter and dark energy

Authors: Dragan Huterer

MOND

Developer of MOND Mordehai Milgrom is constantly fine-tuning the model. Here is the latest of his expositions. *"Bimetric MOND (BIMOND) theories, propounded recently, predict peculiar gravitational interactions between matter and twin matter (TM). Twin matter is hypothetical matter that might couple directly only to the second metric of the theory. Considerations of cosmology in the BIMOND framework suggest that such TM might exist and copy matter in its attributes. Here I investigate the indirect interactions that BIMOND theories predict between nonrelativistic masses of matter and TM."*

[718] arXiv:1001.4444

Title: Matter and twin matter in bimetric MOND

Authors: Mordehai Milgrom

Modified gravity

"The premier alternative to the dark matter paradigm is modified gravity. Following an introduction to the relevant phenomenology of galaxies, I review the MOND paradigm, an effective summary of the observations which any theory must reproduce. A simple nonlinear modified gravity theory does justice to MOND at the nonrelativistic level, but cannot be elevated to the relativistic level in a unique way. I go in detail into the covariant tensor-vector-theory (TeVeS) which not only recovers MOND but can also deal in detail with gravitational lensing and cosmology."

[643] arXiv:1001.3876

Title: Alternatives to dark matter: Modified gravity as an alternative to dark matter

Authors: Jacob D. Bekenstein

WMAP

"A remarkable inconsistency between the calibrated differential time-ordered data (TOD) of the Wilkinson Microwave Anisotropy Probe (WMAP) mission, which is the input for map-making, and the cosmic microwave background (CMB) temperature maps published by the WMAP team is revealed, indicating that there must exist a serious problem in the map making routine of the WMAP team. This inconsistency is easy to be confirmed without the use of WMAP map-making software. In view of the importance of this issue for cosmology study, the authors invite readers to check it by themselves."

[762] arXiv:1001.4643

Title: Inconsistency between WMAP data and released map

Authors: Hao Liu, Ti-Pei Li