



Monthly Notes of the Alternative Cosmology Group – April 2011

The ACG Webmaster who distributes this newsletter to subscribers would prefer not to receive related correspondence.

Please address all correspondence to MNACG Editor, Hilton Ratcliffe: mnacg_editor@cosmology.info.

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 1012 + 1110 papers published on arXiv under astro-ph, together with 641 + 668 under gen-phys, for the months of February and March, 2011. 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 these monthly notes seek to publicise recently published empirical results that are aligned with that ethos. In other words, what observations seem anomalous in terms of the Standard Model of Cosmology? 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".

I. Editor's Comment

The archives of astrophysics publications are becoming sterile. There is a lack of vibrancy and colour in the reported results, and certainly, observational results are less catholic in their approach than they have been in past years. The preferred areas of investigation seem to be primarily exoplanets and mathematical method. Model-dependent cosmology is now the norm, with the added complication that it is now common practice to have sets of models in one's quiver, from which a selection is arbitrarily drawn to fit the requirements of a particular investigation. In other words, the result is pre-determined, and the method is adjustable in several ways to achieve the preferred outcome. There are several examples of this methodology in the section headed "Method".

I have fallen behind with the production of these monthly notes. I apologise for this and am attempting now to get up to date. However, a very important recent paper has come to my attention, so I'm going to pre-empt the July edition of MNACG by citing it now:

1. Title: Is the Universe really expanding?

Authors: [John G. Hartnett](#)
[arXiv:1107.2485v1](#)

Quote: “The Hubble law, determined from the distance moduli and redshifts of galaxies, for the past 80 years, has been used as strong evidence for an expanding universe. This claim is reviewed in light of the claimed lack of necessary evidence for time dilation in quasar and gamma-ray burst luminosity variations and other lines of evidence. It is concluded that the observations could be used to describe either a static universe (where the Hubble law results from some as-yet-unknown mechanism) or an expanding universe described by the standard Λ cold dark matter model. In the latter case, size evolution of galaxies is necessary for agreement with observations. Yet the simple non-expanding Euclidean universe fits most data with the least number of assumptions. From this review it is apparent that there are still many unanswered questions in cosmology and the title question of this paper is still far from being answered.”

II. Members' Books

1. *How the Universe works 'Differently' - Alternative views on time and cosmic evolution* by Noel Eberz (self-published and available from Amazon.com). It is essentially a re-examination of Einstein's Relativity. Interested readers can contact Noel directly at noelwendy@earthlink.net.

III. Supernovae and Standard Candles

Editor's comment: The cosmological distance ladder beyond triangulation is based upon the assumption of Standard Candles (eg. Cepheid Variables and SNe). However, this assumption is speculative and fraught with exceptions which lead to an ever-increasing number of classes.

1. Title: The Subluminous and Peculiar Type Ia Supernova PTF09dav

Authors: [M. Sullivan](#) et al
[arXiv:1103.1797](#)

Quote: “PTF09dav is a peculiar subluminous type Ia supernova (SN) discovered by the Palomar Transient Factory (PTF). Spectroscopically, it appears superficially similar to the class of subluminous SN1991bg-like SNe, but it has several unusual features which make it stand out from this population. Its peak luminosity is fainter than any previously discovered SN1991bg-like SN Ia ($M_B -15.5$), but without the unusually red optical colors expected if the faint luminosity were due to extinction. The photospheric optical spectra have very unusual strong lines of Sc II and Mg I, with possible Sr II, together with stronger than average Ti II and low velocities of ~ 6000 km/s. The host galaxy of PTF09dav is ambiguous. The SN lies either on the extreme outskirts (~ 41 kpc) of a spiral galaxy, or in an very faint ($M_R > -12.8$) dwarf galaxy, unlike other 1991bg-like SNe which are invariably associated with massive, old stellar populations. PTF09dav is also an outlier on the light-curve-width--luminosity and color--luminosity relations derived for other sub-luminous SNe Ia. The inferred ^{56}Ni mass is small ($0.019 \pm 0.003 M_{\text{sun}}$), as is the estimated ejecta mass of $0.36 M_{\text{sun}}$. Taken together, these properties make PTF09dav a remarkable event. We discuss various physical models that could explain PTF09dav. Helium shell detonation or deflagration on the surface of a CO white-dwarf can explain some of the features of PTF09dav, including the presence of Sc and the low photospheric velocities, but the observed Si and Mg are not predicted to be very abundant in these models. **We conclude that no single model is currently capable of explaining all of the observed signatures of PTF09dav.**”

IV. CMBR anomalies

1. Title: Red halos and extragalactic background light

Authors: E. Zackrisson, G. Micheva

[arXiv:1102.0793](https://arxiv.org/abs/1102.0793)

Quote: “Deep surface photometry of disk galaxies at optical and near-IR wavelengths have revealed faint halos with colours much too red to be reconciled with the resolved stellar populations detected in the halos of the Milky Way or M31. Alternative scenarios involving high metallicities, nebular emission or large amounts of dust in these halos are also disfavoured. Here, we argue that **extinction of the optical extragalactic background light** in the halos of these galaxies may possibly be responsible for the reported colour anomalies. We also discuss how an independent measurement of the optical extragalactic background light might be accomplished by combining direct star counts with surface photometry for a single nearby galaxy.”

2. Title: Non-standard morphological relic patterns in the cosmic microwave background

Authors: Joe Zuntz, James P. Zibin, Caroline Zunckel, Jonathan Zwart

[arXiv:1103.6262](https://arxiv.org/abs/1103.6262)

Quote: “Statistically anomalous signals in the microwave background have been extensively studied in general in multipole space, and in real space mainly for circular and other simple patterns. In this paper we search for a range of non-trivial patterns in the temperature data from WMAP 7-year observations. **We find a very significant detection of a number of such features** and discuss their consequences for the essential character of the cosmos.”

V. Redshift

Editor’s comment: There is still a pressing need to establish a definite redshift/brightness trend for distant objects. Although naïve, it is nevertheless fundamental to an expression of light dispersion over time and distance, and the possible role of redshift as a calibrator of this effect. It is also greatly interesting to try to establish some evolutionary marker (eg, metallicity) as a function of redshift.

1. Title: Exploring the Galaxy Mass-Metallicity Relation at $z \sim 3-5$

Authors: Tanmoy Laskar, Edo Berger, Ranga-Ram Chary

[arXiv:1102.1019](https://arxiv.org/abs/1102.1019)

Quote: “In comparison to Lyman-break galaxies at the same redshift, GRB hosts are generally fainter, but the sample is too small to rule out an overall similar luminosity function. On the other hand, the GRB hosts appear to be more luminous than the population of Lyman-alpha emitters at $z \sim 3-4$. Using a conservative range of mass-to-light ratios for simple stellar populations (with ages of 70 Myr to ~ 2 Gyr), we infer the host stellar masses and present mass-metallicity measurements at $z \sim 3-5$ ($\langle z \rangle \sim 3.5$). We find that the detected GRB hosts, with $M^* \sim 2e10$ solar masses, display a wide range of metallicities, but that the mean metallicity at this mass scale, $Z \sim 0.1$ solar, is lower than measurements at $z < 3$. Combined with stacking of the non-detected hosts with $M^* < 3e9$ solar masses and $Z < 0.03$ solar, we find evidence for the existence of an M^*-Z relation at $z \sim 3.5$ and continued evolution of this relation to systematically lower metallicities from $z \sim 2$.”

Editor’s comment: The Lyman Break technique is critically dependent on absorption by intergalactic neutral H, which in turn would be proportional to a large degree on how much intervening space there is between us and the LAE. The remoteness is given by redshift, on the premise that redshift is entirely a Doppler effect. The density of inter-galaxian H is an adjustable parameter in these calculations.

2. Title: Ancient giants: on the farthest galaxy at $z=8.6$

Authors: Pratika Dayal, Andrea Ferrara

[arXiv:1102.1726](https://arxiv.org/abs/1102.1726)

Quote: "The observational frontiers for the detection of high-redshift galaxies have recently been pushed to unimaginable distances with the record-holding Lyman Alpha Emitter (LAE) UDFy-38135539 discovered at redshift $z=8.6$. However, the physical nature and the implications of this discovery have yet to be assessed. By selecting galaxies with observed luminosities similar to UDFy-38135539 in state-of-the-art cosmological simulations tuned to reproduce the large scale properties of LAEs, we bracket the physical nature of UDFy-38135539: it has a star formation rate $\sim 2.7\text{-}3.7$ solar masses/yr, it contains $\sim 10^{8.3\text{-}8.7}$ solar mass of stars 50-80 Myr old, with stellar metallicity $\sim 0.03\text{-}0.12$ of the solar value. For any of the simulated galaxies to be visible as a LAE in the observed range, the intergalactic neutral hydrogen fraction at $z=8.6$ must be ≤ 0.2 and extra ionizing radiation from sources clustered around UDFy-38135539 is necessary. Finally, we predict that there is a 70% (15%) probability of detecting at least 1 such source from JWST (HST/WFC3) observations in a physical radius ~ 0.4 Mpc around UDFy-38135539."

3. **Title: Red Shift in a Laboratory Environment**

Authors: [Yuriy A. Yatsunenکو](#), [Julian A. Budagov](#)

<http://arxiv.org/abs/1103.0808>

Quote: "A hypotheses of energy loss for polarization of $e\text{-}e^+$ vacuum by a photon passing interstellar space is considered. An excitation and relaxation of vacuum can't run with speed of light due to very small but finite fraction of $e\text{-}e^+$ pair mass that creates a retardment in recuperation of deposited energy back to photon. This "forgotten" by many photons energy is finally splashed out in real space as a Relic Radiation. An assumption that such energy loss is proportional to a photon energy conforms to Hubble law of Red Shift and experimental data treated as accelerated expansion of Universe. A possibility of an observation of this type energy loss is considered at high-energy accelerators where energy deposition may reach up hundreds MeV in second."

VI. **MOND**

1. **Title: Constraining the MODified Newtonian Dynamics from spherically symmetrical hydrodynamic accretion**

Authors: [Nirupam Roy](#)

[arXiv:1102.0289](http://arxiv.org/abs/1102.0289)

2. **Title: Gravitational Cherenkov losses in MOND theories**

Authors: [Mordehai Milgrom](#)

[arXiv:1102.1818](http://arxiv.org/abs/1102.1818)

3. **Title: A Novel Test of the Modified Newtonian Dynamics with Gas Rich Galaxies**

Authors: [Stacy S. McGaugh](#)

[arXiv:1102.3913](http://arxiv.org/abs/1102.3913)

Quote: "The current cosmological paradigm, LCDM, requires that the mass-energy of the universe be dominated by invisible components: dark matter and dark energy. An alternative to these dark components is that the law of gravity be modified on the relevant scales. A test of these ideas is provided by the Baryonic Tully-Fisher Relation (BTFR), an empirical relation between the observed mass of a galaxy and its rotation velocity. Here I report a test using gas rich galaxies for which both axes of the BTFR can be measured independently of the theories being tested and without the systematic uncertainty in stellar mass that affects the same test with star dominated spirals. The data fall precisely where predicted a priori by the modified Newtonian dynamics (MOND). The scatter in the BTFR is attributable entirely to observational uncertainty. **This is consistent with the action of a single effective force law but poses a serious fine-tuning problem for LCDM.**"

VII. Stellar Evolution and Large-Scale Structure

1. Title: No Evidence for Evolution in the Far-Infrared-Radio Correlation out to $z \sim 2$ in the eCDFs

Authors: [Minnie Y. Mao](#), [Minh Huynh](#), [Ray P. Norris](#), [Mark Dickinson](#), [David Frayer](#), [George Helou](#), [Jacqueline Monkiewicz](#)
[arXiv:1102.3249](#)

Quote: “We investigate the 70 μm Far-Infrared Radio Correlation (FRC) of star-forming galaxies in the Extended Chandra Deep Field South (ECDFS) out to $z > 2$. We use 70 μm data from the Far-Infrared Deep Extragalactic Legacy Survey (FIDEL), which comprises the most sensitive (~ 0.8 mJy rms) and extensive far-infrared deep field observations using MIPS on the Spitzer Space Telescope, and 1.4 GHz radio data (~ 8 uJy/beam rms) from the VLA. In order to quantify the evolution of the FRC we use both survival analysis and stacking techniques which we find give similar results. We also calculate the FRC using total infrared luminosity and rest-frame radio luminosity, q_{TIR} , and find that q_{TIR} is constant (within 0.22) over the redshift range 0 - 2. We see no evidence for evolution in the FRC at 70 μm which is surprising given the many factors that are expected to change this ratio at high redshifts.”

VIII. Dark Matter

Editor's comment: Some analysts are quite open about the physics requirements of non-baryonic phenomena.

1. Title: Too big to fail? The puzzling darkness of massive Milky Way subhaloes

Authors: [Michael Boylan-Kolchin](#), [James S. Bullock](#), [Manoj Kaplinghat](#)

[a arXiv:1103.0007](#)

Quote: “We show that dissipationless LCDM simulations predict that the majority of the most massive subhaloes of the Milky Way are too dense to host any of its bright satellites ($L_V > 10^5 L_{\text{sun}}$). These dark subhaloes have circular velocities at infall of 30-70 km/s and infall masses of $[0.2-4] \times 10^{10} M_{\text{sun}}$. Unless the Milky Way is a statistical anomaly, this implies that galaxy formation becomes effectively stochastic at these masses. This is in marked contrast to the well-established monotonic relation between galaxy luminosity and halo circular velocity (or halo mass) for more massive haloes. We show that at least two (and typically four) of these massive dark subhaloes are expected to produce a larger dark matter annihilation flux than Draco. It may be possible to circumvent these conclusions if baryonic feedback in dwarf satellites or different dark matter physics can reduce the central densities of massive subhaloes by order unity on a scale of 0.3 - 1 kpc.”

2. Title: The Black Hole, the Big Bang: a Cosmology in Crisis

Authors: [Stephen J. Crothers](#)

[viXra:1103.0047](#)

Quote: “It is often claimed that cosmology became a true scientific inquiry with the advent of the General Theory of Relativity. A few subsequent putative observations have been misconstrued in such a way as to support the prevailing Big Bang model by which the Universe is alleged to have burst into existence from an infinitely dense point-mass singularity. Yet it can be shown that the General Theory of Relativity and the Big Bang model are in conflict with well-established experimental facts.”

IX. Method

Editor's comment: In order to convert lateral angular separation to linear separation, the authors of the following paper assume that lateral expansion is quantitatively the same as line-of-sight expansion.

1. Title: A distance estimate based on angular expansion for the planetary nebula NGC 6881

Authors: [Lizette Guzman-Ramirez](#), [Yolanda Gomez](#), [Laurent Loinard](#), [Daniel Tafaya](#)

<http://arxiv.org/abs/1103.0231>

Quote: *“In this paper, we report on high angular resolution radio observations of the planetary nebula NGC 6881 obtained with the Very Large Array at a wavelength of 6 cm. The emission appears to be the superposition of a roundish core and a point-symmetric bipolar structure elongated along a position angle of about 145° . This is strongly reminiscent of the morphology seen in $H\alpha$ and [NII] images. A comparison between VLA observations obtained in 1984 and 1994 clearly reveals the expansion of the core of the nebula, at a rate of 2.1 ± 0.7 mas yr⁻¹. Assuming that the expansion velocity in the plane of the sky (determined from these measurements) and the expansion velocity along the line of sight (estimated from optical spectroscopy available in the literature) are equal, we find a distance to NGC 6881 of 1.6 ± 0.5 kpc ± 0.3 kpc, where the first error reflects the uncertainty on the expansion, and the second error comes from the potential difference between pattern and material speeds. This distance is compatible with (but does not necessarily imply) an association of NGC 6881 with the nearby HII region Sh 2-109 and, more generally, the Cygnus star-forming region.”*

2. **Title: Feedback in Galaxy Formation**

Authors: [Joseph Silk](#)

[arXiv:1102.0283](#)

Quote: *“I review the outstanding problems in galaxy formation theory, and the role of feedback in resolving them. I address the efficiency of star formation, the galactic star formation rate, and the roles of supernovae and supermassive black holes.”*

3. **Title: “Dust in the early Universe: Evidence for non-stellar dust production or observational errors?”**

Authors: [Lars Mattsson](#)

[arXiv:1102.0570](#)

Quote: *“A model including metallicity-dependent, non-stellar dust formation ('secondary dust') is presented. The required contribution from this non-stellar dust component appears too large, however. If all observational constraints are to be met, the resultant dust-to-metals ratio is close to unity, which means that almost all interstellar metals exist in the form dust. This is a very unlikely situation and suggests the large dust-to-gas ratios at high-redshifts may be due to observational uncertainties and/or or incorrect calibration of conversion factors for gas and dust tracers.”*

Editor's comment: The list of assumptions and choice of sub models in the following paper illustrates a methodology that lies at the heart of the problem for modern cosmology. Bouwens et al, whose work is the basis for Reddy's commentary, employ the Lyman Break technique to select those galaxies in the HUDF with the greatest redshift. The method utilises the supposed rate of absorption by neutral H within galaxies or in intervening space of photons more energetic than Lyman-alpha (10.2 eV). The uncertainties should be obvious. It also requires a massive assembly of dark matter in the early Universe to propel the mooted ten-fold increase in galaxian luminosity in the first 2 billion years of expansion.

4. **Title: A Glimpse of the First Galaxies**

Authors: [Naveen A. Reddy](#)

[arXiv:1102.1017](#)

Quote: *“Bouwens and colleagues' study probes galaxies at the heart of this 'reionization' epoch. Given some — albeit very uncertain — assumptions of the clumpiness of gas in the Universe and the fraction of ionizing photons that can escape galaxies, they argue that galaxies at redshift 10 may not provide enough ultraviolet flux to reionize the Universe. The dominant contributor to the ionizing flux at early cosmic epochs remains a mystery. Nonetheless,*

the plausible detection of a galaxy at redshift 10 suggests an onset of star formation at redshift beyond 12 (about 100 million years earlier), potentially increasing the role of galaxies in the early ionization of the Universe."

5. Title: Observational Cosmology And The Cosmic Distance Duality Relation

Authors: [Remya Nair](#), [Sanjay Jhingan](#), [Deepak Jain](#)

[arXiv:1102.1065](#)

Quote: *"We study the validity of cosmic distance duality relation between angular diameter and luminosity distances. To test this duality relation we use the latest Union2 Supernovae Type Ia (SNe Ia) data for estimating the luminosity distance. The estimation of angular diameter distance comes from the samples of galaxy clusters (real and mock) and FRIB radio galaxies. We parameterize the distance duality relation as a function of redshift in six different ways. Our results rule out some of the parameterizations significantly."*

6. Title: Neutron Repulsion

Authors: [Oliver K. Manuel](#)

[arXiv:1102.1499](#)

Quote: *"Neutron repulsion was recognized in nuclear rest mass data in 2000 as the overlooked source of energy, the keystone of an arch that locked together these puzzling space-age observations: 1.) Excess ^{136}Xe accompanied primordial helium in the stellar debris that formed the solar system (Fig. 1); 2.) The Sun formed on the supernova core (Fig. 2); 3.) Waste products from the core pass through an iron-rich mantle, selectively carrying lighter elements and lighter isotopes of each element into the photosphere (Figs. 3-4); and 4.) Neutron repulsion powers the Sun and sustains life (Figs. 5-7). Together these findings offer a framework for understanding how: a.) The Sun generates and releases neutrinos, energy and solar-wind hydrogen and helium; b.) An inhabitable planet formed and life evolved around an ordinary-looking star; c.) Continuous climate change - induced by cyclic changes in gravitational interactions of the Sun's energetic core with planets - has favored survival by adaptation."*

7. Title: Quantum Mechanics: Incomplete and Non Local Theory

Authors: [M.Cattani](#)

<http://arxiv.org/abs/1103.0420>

Quote: *"We will show for undergraduate and graduate students of physics that Quantum Mechanics is an incomplete and non-local theory. The problem of non-locality is discussed by analyzing the Bell's theorem where are considered correlations between measurements results performed on physical systems that are far apart, but that interacted in the past. The experimental violations of Bell's theorem show a very general result that quantum phenomena are nonlocal and that, inevitably, Quantum Mechanics is non-local. "*

8. Title: The Genesis of the Big-Bang and Inflation

Authors: [R. K. Thakur](#)

[arXiv:1103.3688](#)

Quote: *"The model used is singularity free Newtonian, i.e., non-relativistic, oscillatory model of the universe in which the "space" does not expand whereas all the relativistic cosmological models of the universe including the standard model, except the now discredited Einstein's static model, imply that apart from the matter and the radiation in the universe the "space" is also expanding. However, there is no observational evidence whatsoever of the expansion of the "space" and as such, in all probability, the "space" is not at all expanding. A critique of the singularity theorems is also given on the basis of the experimental findings at CERN and RHIC and it is emphasized that no gravitationally collapsing object can collapse to a singularity, if it does, the time honoured Pauli's exclusion principle would be violated."*

X. Titles of the month

1. Title: A Paradoxical Property of the Monkey Book

Authors: [Sebastian Bernhardsson](#), [Seung Ki Baek](#), [Petter Minnhagen](#)
[arXiv:1103.2681](#)

2. Title: Damping in quantum love affairs

Authors: [Fabio Bagarello](#)

[arXiv:1103.5907](#)

Quote: ""