



The Milky Way Panorama Credit: ESO / S. Brunier

Newsletter of *A Cosmology Group* - August 2019

A Cosmology Group draws its mandate from the *Open Letter to the Scientific Community* to engage scientists in an open exchange of ideas beyond the framework of a Big Bang cosmology. The *ACG Newsletter* highlights observational results that are anomalous in terms of the Λ CDM model and provides a critical examination¹ of the methods and investigations used in cosmology.

The *Newsletter* is published irregularly, editor's schedule permitting, and when interesting papers are available. ACG subscribers² receive notifications of *Newsletter* publications. You can subscribe to *ACG Notifications* either by sending a request to redshift@cosmology.info, by joining the ACG Forum 'Alt Cosmology' on *Yahoo! Groups* at groups.yahoo.com/neo/groups/altcosmology/info#.

If you would like to suggest a paper for review, please send a direct reference to redshift@cosmology.info. Published work in a refereed journal and with open access (e.g. a preprint on [arXiv](http://arxiv.org) or HAL) is preferred. Summaries of new cosmologies are collected on [A Cosmology Model](#) or can be presented at the next [ACG Conference](#).

ACG Editorial

1969, July 21st just before 11 pm: I am sitting on the floor watching TV. Blurry images, transmitted in black and white, show Neil Armstrong stepping down a ladder to the surface of the moon. I'm upset because my dad woke me up in the middle of the night (that's probably why I still remember all this). The event was possible thanks to our best technology and the efforts of thousands of competent people.

In the next 50 years, technological developments would produce pocket-size computers with a million times the memory of the Lunar Module computer. Today, our telescopes give us a resolution of 40 meters at the distance of the moon and they can see galaxies beyond $z = 10$.

Yet we can't land a man on the moon today, and despite the availability of the most powerful telescopes cosmologists are 95% in the dark about the universe. How did that happen? I won't discuss this here, but hopefully this Newsletter, systematic research and discussions will be able to stimulate some progress in cosmology.

This month: more Hubble tension, inconsistencies between observations and calculations based on the standard Big Bang nucleosynthesis, redshift is not an indication of expansion, and death by dark matter.

Regards,

Louis Marmet, August 5, 2019

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¹When the thesis is supported by empirical data.

²ACG has 49 subscribers to *ACG Notifications* and 70 followers on *Alt Cosmology Yahoo! Group*.

Reviewed Publications³

- Redshift

“The Carnegie-Chicago Hubble Program. VIII. An Independent Determination of the Hubble Constant Based on the Tip of the Red Giant Branch”

W.L. Freedman *et al.*, The Astrophysical Journal (accepted), 2019

[arXiv:1907.05922](https://arxiv.org/abs/1907.05922)

A new and independent value of the Hubble constant has been determined based on a calibration of the Tip of the Red Giant Branch applied to Type Ia supernovae: $H_0 = 69.8 \pm 0.8(\text{stat}) \pm 1.7(\text{sys}) \text{ km/sec/Mpc}$. This method is both precise and accurate, and is parallel to, but independent of the Cepheid distance scale. The value sits midway in the range defined by the current Hubble tension.

“The photospheric origin of the Yonetoku relation in gamma-ray bursts”

H. Ito *et al.*, Nature Communications 1504, Vol. 10, Issue 1, 2019

doi: [10.1038/s41467-019-09281-z](https://doi.org/10.1038/s41467-019-09281-z)

Despite decades of study, there is still no consensus on the emission mechanism of long duration gamma-ray bursts (FRB). One unresolved question is the origin of the tight correlation between the spectral peak energy and peak luminosity discovered in observations. Long duration gamma-ray bursts are the brightest events since the Big Bang itself.

This paper is listed in this 'redshift' section because the identification of FRB progenitors as systems located in distant galaxies might be at fault. It could also originate from nearby objects which are very faint (see GRB 790305b en.wikipedia.org/wiki/GRB_790305b).

“UV surface brightness of galaxies from the local Universe to $z \sim 5$ ”

E.J. Lerner, R. Falomo, R. Scarpa, Int. J. Mod. Phys. D 23, 1450058, 2014

doi: [10.1142/S0218271814500588](https://doi.org/10.1142/S0218271814500588), and [arXiv:1405.0275](https://arxiv.org/abs/1405.0275)

The Tolman test for the expansion of the Universe is reexamined by adopting a static Euclidean Universe with a linear Hubble relation at all z . The result is a relation between flux and luminosity that is virtually indistinguishable from the one used for Lambda-CDM models. Based on the analysis of data taken from HUDF and GALEX datasets up to $z \sim 5$, it is shown that a static model of the universe is compatible with observations.

- Nucleosynthesis

“Back to the Lithium Plateau with J0023+0307 with $[\text{Fe}/\text{H}] < -6$ ”

D.S. Aguado *et al.*, The Astrophysical Journal Letters, Vol. 874, No. 2, 2019

doi: [10.3847/2041-8213/ab1076](https://doi.org/10.3847/2041-8213/ab1076), and [arXiv:1904.04892](https://arxiv.org/abs/1904.04892)

J0023+0307, a main-sequence extremely iron-poor dwarf star (D.S. Aguado *et al.*, “A Mega Metal-poor Dwarf Star from SDSS/BOSS,” The [Astrophysical Journal Letters](https://doi.org/10.3847/2041-8213/ab1076), Volume 854, Number 2, 2018), has a low iron content $[\text{Fe}/\text{H}] < -6.1$ and very low $[\text{Fe}/\text{Mg}]$ and $[\text{Ca}/\text{Mg}]$ abundance ratios, but relatively high absolute Mg and Si abundances. This suggests that it is a second generation star formed from a molecular cloud polluted by only one supernova in which the fall-back mechanism played a role.

This star is also unique having a lithium abundance ($A(\text{Li}) = 2.02 \pm 0.08$) close to the level of the Lithium Plateau, in contrast with lower Li determinations or upper limits in all other extremely iron-poor stars. The upper envelope of the lithium abundances in unevolved stars spanning more than three orders of magnitude in

³Quoted text is adapted from the original articles: underlined text is my emphasis, *italicized text are my comments*.

metallicity ($-6 < [\text{Fe}/\text{H}] < -2.5$) defines a nearly constant value. We argue that it is unlikely that such uniformity is the result of depletion processes in stars from a significantly higher initial Li abundance, but suggests instead a lower primordial production, pointing to new physics such as decaying massive particles, varying fundamental constants, or nuclear resonances, that could have affected the primordial ${}^7\text{Li}$ production.

Another failure of Big Bang nucleosynthesis, which requires new physics to explain the ${}^7\text{Li}$ abundance.

“Cosmological Lithium Problems”

C.A. Bertulani, Shubh chintak, A.M. Mukhamedzhanov, EPJ Web of Conferences 184, 01002, 2018
doi: [10.1051/epjconf/201818401002](https://doi.org/10.1051/epjconf/201818401002), and [arXiv:1802.03469](https://arxiv.org/abs/1802.03469)

The cosmological lithium problem has become one of the most intriguing open questions in cosmology due to inconsistencies between observation and calculations based on the standard Big Bang nucleosynthesis (BBN) for the primordial elemental abundances.

Astronomical observations yield the ratio of density parameters $\Omega_{DM}/\Omega_{visible} = 4.94 \pm 0.66$. Therefore, dark matter is 5 times more frequent than visible matter. This feature was used to explore the possible existence of 5 dark sectors instead of the single ubiquitous dark sector.

The ${}^7\text{Li}$ problem remains because if $T'/T \sim 1$ then ${}^7\text{Li}$ comes out right, but the other abundances will be completely off the observations.

Not only dark matter is invisible, now it is located in an invisible universe!

Their comment “The puzzle has been around the literature for a few decades already” is an understatement, c.f. in 1982 <https://ui.adsabs.harvard.edu/abs/1982A%26A...115..357S/abstract>.

Perhaps a simpler explanation is that our universe is much older than 14 Gy. In that case, star nucleosynthesis à la Burbidge, Burbidge, Fowler and Hoyle has plenty of time to produce the correct amount of lithium.

- Large-Scale Structure

“HST unveils a compact mildly relativistic broad-line region in the candidate true type 2 NGC 3147”

S. Bianchi *et al.*, Monthly Notices of the Royal Astronomical Society: Letters 488, Issue 1, p. L1, Sept. 2019
doi: [10.1093/mnrasl/slz080](https://doi.org/10.1093/mnrasl/slz080)

Accretion discs are used in many astrophysical models. However... NGC 3147 has been considered the best case of a true type 2 AGN: an unobscured AGN, based on the unabsorbed compact X-ray continuum, which lacks a broad-line region (BLR). However, the very low luminosity of NGC 3147 implies a compact BLR, which produces very broad lines, hard to detect against the dominant background host galaxy. The detection of a thin disc, which extends below $100r_g$ in an $L/L_{Edd} \sim 10^{-4}$ system, contradicts the current view of the accretion flow configuration at extremely low accretion rates.

“Death by Dark Matter”

J.S. Sidhu, R.J. Scherrer, G. Starkman, arXiv: Cosmology and Nongalactic Astrophysics, 2019
[arXiv:1907.06674](https://arxiv.org/abs/1907.06674)

A wide range of macro masses M_X and cross-sections σ_X for dark matter candidates remain unprobed. We show that over a wide region within the unexplored parameter space, collisions of a macro with a human body would result in serious injury or death. We use the absence of such unexplained impacts with a well-monitored subset of the human population to exclude a region bounded by $\sigma_X \geq 10^{-8} - 10^{-7} \text{ cm}^2$ and $M_X < 50 \text{ kg}$. Our results open a new window on dark matter: the human body as a dark matter detector.

There is still a long way to go before we settle how many angels could dance on the point of a needle...

- Old Systems

“J1342+0928 Supports the Timeline in the $R_h=ct$ Cosmology”

F. Melia, *Astronomy and Astrophysics* 615, A113, July 2018

doi: [10.1051/0004-6361/201832752](https://doi.org/10.1051/0004-6361/201832752), and [arXiv:1712.03306](https://arxiv.org/abs/1712.03306)

The discovery of quasar J1342+0928 ($z = 7.54$) reinforces the time compression problem associated with the premature formation of structure in Λ CDM. Adopting the Planck parameters, we see this quasar barely 690 Myr after the big bang, no more than several hundred Myr after the transition from Pop III \rightarrow II star formation. Yet conventional astrophysics would tell us that a 10 solar-mass seed, created by a Pop II/III supernova, should have taken at least 820 Myr to grow via Eddington-limited accretion. This failure by Λ CDM constitutes one of its most serious challenges, requiring exotic ‘fixes’, such as anomalously high accretion rates, or the creation of enormously massive ($\sim 10^5 M_\odot$) seeds, neither of which is ever seen in the local Universe, or anywhere else for that matter.

Contrary to the tension created in the standard model by the appearance of this massive quasar so early in its history, we find that in the $R_h=ct$ cosmology, a 10 solar-mass seed at $z \sim 15$ (the start of the Epoch of Reionization at $t \sim 878$ Myr) would have easily grown into an 8×10^8 solar-mass black hole at $z = 7.54$ ($t \sim 1.65$ Gyr) via conventional Eddington-limited accretion.

“The Distribution of Ly α -Emitting Galaxies at $z=2.38$ ”

P. Palunas *et al.*, *Astrophysical Journal* 602, 545, 2004

doi: [10.1086/381145](https://doi.org/10.1086/381145), and [arXiv:astro-ph/0311279](https://arxiv.org/abs/astro-ph/0311279)

We present the detection of 34 Ly-alpha emission-line galaxy candidates in a $80 \times 80 \times 60$ co-moving Mpc region surrounding the known $z = 2.38$ galaxy cluster J2143-4423. The distribution of these galaxy candidates contains several 5-10 Mpc scale voids. Our observations thus tentatively suggest that the galaxy distribution at redshift 2.38 contains larger voids than predicted by current models.

The NASA top story is more explicit: “Giant Galaxy String Defies Models Of How Universe Evolved”

www.nasa.gov/centers/goddard/news/topstory/2004/0107filament.html

- Cosmology

“The 1919 Eddington eclipse”

D. Soares, *Research Gate* May 2019

doi: [10.13140/RG.2.2.33288.88321](https://doi.org/10.13140/RG.2.2.33288.88321)

Some facts are presented that corroborate the widespread notion that the expeditions organized to observe the 1919 solar eclipse served British astrophysicist Arthur Eddington’s purpose of demonstrating his approval and enthusiasm for Einstein’s gravity theory. Similar behavior is observed in modern science, with the caveat that the authority to validate an experiment has shifted from a single individual to either a group that endorses a given scientific view, or to the amount of financial resources applied to the accomplishment of the experimental result.

“Concordance and discordance in cosmology”

M. Raveri, W. Hu, *Phys. Rev. D* 99, 043506, 2019

doi: [10.1103/PhysRevD.99.043506](https://doi.org/10.1103/PhysRevD.99.043506), and [arXiv:1806.04649](https://arxiv.org/abs/1806.04649)

The success of present and future cosmological studies is tied to the ability to detect discrepancies within the framework of a cosmological model. Tensions caused by the presence of unknown systematic effects need to be isolated and corrected, while discrepancies due to new physical phenomena need to be promptly identified. We derive a series of results that show that discrepancies indeed arise within the standard Λ CDM model. Several of them exceed the probability threshold of 95% and deserve a dedicated effort to understand their origin.

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