The First Crisis in Cosmology Conference

Monção, Portugal, June 23–25 2005

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The author attended the first Crisis in Cosmology Conference of the recently associated Alternative Cosmology Group, and makes an informal report on the proceedings with some detail on selected presentations.

In May 2004, a group of about 30 concerned scientists published an open letter to the global scientific community in *New Scientist* in which they protested the stranglehold of Big Bang theory on cosmological research and funding. The letter was placed on the Internet* and rapidly attracted wide attention. It currently has about 300 signatories representing scientists and researchers of disparate backgrounds, and has led to a loose association now known as the Alternative Cosmology Group†. This writer was one of the early signatories to the letter, and holding the view that the Big Bang explanation of the Universe is scientifically untenable, patently illogical, and without any solid observational support whatsoever, became involved in the organisation of an international forum where we could share ideas and plan our way forward. That idea became a reality with the staging of the *First Crisis in Cosmology Conference* (CCC-1) in the lovely, medieval walled village of Monção, far northern Portugal, over 3 days in June of this year.

It was sponsored in part by the University of Minho in Braga, Portugal, and the Institute for Advanced Studies at Austin, Texas. Professor José Almeida of the Department of Physics at the University of Minho was instrumental in the organisation and ultimate success of an event that is now to be held annually. The conference was arranged in 3 sessions. On the first day, papers were presented on observations that challenge the present model, the second day dealt with conceptual difficulties in the standard model, and we concluded with alternative cosmological world-views. Since it is not practicable here to review all the papers presented (some 34 in total, plus 6 posters), I'll selectively confine my comments to those that interested me particularly. The American Institute of Physics will publish the proceedings of the conference in their entirety in due course for those interested in the detail.

First up was professional astronomer Dr. Riccardo Scarpa of the European Southern Observatory, Santiago, Chile. His job involves working with the magnificent Very Large Telescope array at Paranal, and I guess that makes him the envy of just about every astronomer with blood in his veins! His paper was on Modified Newtonian Dynamics (MOND), which I had eagerly anticipated and thoroughly appreciated. MOND is a very exciting development in observational astronomy used to make Dark Matter redundant in the explanation of cosmic gravitational effects like the anomalous rotational speeds of galaxies. Mordehai Milgrom of the Weizmann Institute in Israel first noticed that mass discrepancies in stellar systems are detected only when the internal acceleration of gravity falls below the well-established value $a_0 = 1.2\times10^{-8}$ cm×s^{-2}. The standard Newtonian gravitational values fit perfectly above this threshold, and below a_0 MOND posits a breakdown of Newton's law. The dependence then becomes linear with an asymptotic value of acceleration $a = (a_0\, g)^{1/2}$, where g is the Newtonian value. Scarpa has called this the *weak gravitational regime*, and he and colleagues Marconi and Gilmozzi have applied it extensively to globular clusters with 100% success. What impressed me most was that the clear empirical basis of MOND has been thoroughly tested, and is now in daily use by professional astronomers at what is arguably the most sophisticated and advanced optical-infrared observatory in the world. In practice, there is no need to invoke Dark Matter. Quote from Riccardo: "*Dark Matter is the craziest idea we've ever had in astronomy. It can appear when you need it, it can do what you like, be distributed in any way you like. It is the fairy tale of astronomy*".

Big Bang theory depends critically on three first principles: that the Universe is holistically and systematically expanding as per the Friedmann model; that General Relativity correctly describes gravitation; and that Milne's Cosmological Principle, which declares that the Universe at some arbitrary "large scale" is isotropic and homogeneous, is true. The falsification of any one of these principles would lead to the catastrophic failure of the theory. We saw at the conference that all three can be successfully challenged on the basis of empirical science. Retired electrical engineer Tom Andrews presented a novel approach to the validation (or rather, invalidation) of the expanding Universe model. It is well known that type 1A supernovae (SNe) show measurable anomalous dimming (with distance or remoteness in time) in a flat expanding Universe model. Andrews used

*http://www.cosmologystatement.org/

†http://www.cosmology.info/

observational data from two independent sets of measurements of brightest cluster galaxies (defined as the brightest galaxy in a cluster). It was expected, since the light from the SNe and the bright galaxies traverses the same space to get to us, that the latter should also be anomalously dimmed. They clearly are not. The orthodox explanation for SNe dimming — that it is the result of the progressive expansion of space — is thereby refuted. He puts a further nail in the coffin by citing Goldhaber's study of SNe light curves, which did not reveal the second predicted light-broadening effect due to time dilation. Says Andrews: "*The Hubble redshift of Fourier harmonic frequencies [for SNe] is shown to broaden the light curve at the observer by* $(1+z)$. *Since this broadening spreads the total luminosity over a longer time period, the apparent luminosity at the observer is decreased by the same factor. This accounts quantitatively for the dimming of SNe. On the other hand, no anomalous dimming occurs for galaxies since the luminosity remains constant over time periods much longer than the light travel time to the observer. This effect is consistent with the non-expanding Universe model. The expanding model is logically falsified*".

Professor Mike Disney of the School of Physics and Astronomy at Cardiff University calls a spade a spade. He has created an interesting benchmark for the evaluation of scientific models — he compares the number of free parameters in a theory with the number of independent measurements, and sets an arbitrary minimum of $+3$ for the excess of measurements over free parameters to indicate that the theory is empirically viable. He ran through the exercise for the Big Bang model, and arrived at a figure of -3 (17 free parameters against 14 measured). He therefore argued that the there is little statistical significance in the good fits claimed by Big Bang cosmologists since the surfeit of free parameters can easily mould new data to fit a desired conclusion. Quote: "*The study of some 60 cultures, going back 12,000 years, shows that, like it or not, we will always have a cosmology, and there have always been more free parameters than independent measurements. The best model is a compromise between parsimony (Occam's razor) and goodness-of-fit*".

Disney has a case there, and it is amply illustrated when it comes to Big Bang Nucleosynthesis (which depends initially on an arbitrarily set baryon/photon ratio), and the abundances of chemical elements. Dr. Tom van Flandern is another straight talking, no frills man of science. He opened his abstract with the words "*The Big Bang has never achieved a true prediction success where the theory was placed at risk of falsification before the results were known*". Ten years ago, Tom's web site listed the Top Ten Problems with the Big Bang, and today he has limited it to the Top Fifty. He pointed out the following contradictions in predicted light element abundances: observed deuterium abundances don't tie up with observed abundances of ^{4}He and ^{7}Li, and attempts to explain this inconsistency have failed. The ratio of deuterium to hydrogen near the centre of the Milky Way is 5 orders of magnitude higher than the Standard Model predicts, and measuring either for quasars produces deviation from predictions. Also problematic for BBN are barium and beryllium, produced assumedly as secondary products of supernovae by the process of spallation. However, observations of metal-poor stars show greater abundance of Be than possible by spallation. Van Flandern: "*It should be evident to objective minds that nothing about the Universe interpreted with the Big Bang theory is necessarily right, not even the most basic idea in it that the Universe is expanding*".

Problems in describing the geometry of the Universe were dealt with by several speakers, and we must here of course drill down a bit to where the notion came from (in the context of Big Bang theory). The theory originated in Father Georges Lemaître's extensions to Friedmann's solution of the Einstein General Relativity (GR) field equations, which showed that the Universe described in GR could not be static as Einstein believed. From this starting point emerged some irksome dilemmas regarding the fundamental nature of space and the distribution of matter within it. It was here more than anywhere that the rich diversity of opinion and approach within the Alternative Cosmology Group was demonstrated. Professor Yurij Baryshev of the Institute of Astronomy at St. Petersburg State University quietly presented his argument against the Cosmological Principle: large-scale structure is not possible in the Friedmann model, yet observation shows it for as far as we can see. I had recently read Yurij's book *The Discovery of Cosmic Fractals*, and knew that he had studied the geometric fractals of Yale's famous Professor Benoit Mandelbrot, which in turn led to his extrapolation of a fractal (inhomogeneous, anisotropic) non-expanding large-scale universe. Baryshev discussed gravitation from the standpoint that the physics of gravity should be the focus of cosmological research. General Relativity and the Feynman field are different at all scales, although to date, all relativistic tests cannot distinguish between them. He pointed out that if one reversed the flow and shrunk the radius, eventually the point would be reached where the energy density of the Universe would exceed the rest mass, and that is logically impossible. He left us with this gem: Feynman to his wife (upon returning from a conference) "*Remind me not to attend any more gravity conferences*!"

Conference co-ordinator Professor José Almeida presented a well-argued case for an interesting and unusual world-view: a hyperspherical Universe of 4-D Euclidean space (called 4-Dimensional Optics or 4DO) rather than the standard non-Euclidean Minkowski space. Dr. Franco Selleri of the Università di Bari in Italy provided an equally interesting alternative — the certainty that the Universe in which we live and breathe is a construction in simple 3-D Euclidean space precludes the possibility of the Big Bang model. He says: "*No structure in three dimensional space, born from an explosion that occurred 10 to 20 billion years ago, could*

resemble the Universe we observe". The key to Selleri's theory is absolute simultaneity, obtained by using a term e_1 (the coefficient of x in the transformation of time) in the Lorentz transformations, so that $e_1 = 0$. Setting $e_1 = 0$ separates time and space, and a conception of reality is introduced in which no room is left for a fourth dimension. Both Big Bang and its progenitor General Relativity depend critically on 4-D Minkowski space, so the argument regressed even further to the viability of Relativity itself. And here is where the big guns come in!

World-renowned mathematical physicist Professor Huseyin Yilmaz, formerly of the Institute for Advanced Studies at Princeton University, and his hands-on experimentalist colleague Professor Carrol Alley of the University of Maryland, introduced us to the Yilmaz cosmology. Altogether 4 papers were presented at CCC-1 on various aspects of Yilmaz theory, and a fifth, by Dr. Hal Puthoff of the Institute for Advanced Studies at Austin, was brought to the conference but not presented. It is no longer controversial to suggest that GR has flaws, although I still feel awkward saying it out loud! Professor Yilmaz focussed on the fact that GR excludes gravitational stress-energy as a source of curvature. Consequently, stress-energy is merely a coordinate artefact in GR, whereas in the Yilmaz modification it is a true tensor. Hal Puthoff described the GR term to me as a "*pseudo-tensor, which can appear or disappear depending on how you treat mass*". The crucial implication of this, in the words of Professor Alley, is that since "*interactions are carried by the field stress energy, there are no interactive n-body solutions to the field equations of General Relativity*". In plain language, GR is a single-body description of gravity! The Yilmaz equations contain the correct terms, and they have been applied with success to various vexing problems, for example the precession of Mercury's perihelion, lunar laser ranging measurements, the flying of atomic clocks in aircraft, the relativistic behaviour of clocks in the GPS, and the predicted *Sagnac effect* in the one-way speed of light on a rotating table. Anecdote from Professor Alley: at a lecture by Einstein in the 1920's, Professor Sagnac was in the audience. He questioned Einstein on the *gedanken* experiment regarding contra-radiating light on a rotating plate. Einstein thought for a while and said, "That has got nothing to do with relativity". Sagnac loudly replied, "In that case, Dr. Einstein, relativity has got nothing to do with reality!"

The great observational "proof" of Big Bang theory is undoubtedly the grandly titled Cosmic Microwave Background Radiation, stumbled upon by radio engineers Penzias and Wilson in 1965, hijacked by Princeton cosmologist Jim Peebles, and demurely described by UC's COBE data analyser Dr. George Smoot as "*like looking at the fingerprint of God*". Well, it's come back to haunt them! I was delighted that despite some difficulties Glenn Starkman of Case Western Reserve University was able to get his paper presented at the conference as I had been keenly following his work on the Wilkinson Microwave Anisotropy Probe (WMAP) data. Dr. Starkman has discovered some unexpected (for Big Bangers) characteristics (he describes them as "bizarre") in the data that have serious consequences for the Standard Model. Far from having the smooth, Gaussian distribution predicted by Big Bang, the microwave picture has distinct anisotropies, and what's more says Starkman, they are clearly aligned with local astrophysical structures, particularly the ecliptic of the Solar System. Once the dipole harmonic is stripped to remove the effect of the motion of the Solar System, the other harmonics, quadrupole, octopole, and so on reveal a distinct alignment with local objects, and show also a preferred direction towards the Virgo supercluster. Conference chair, plasma physicist Eric Lerner concurred in his paper. He suggested that the microwave background is nothing more than a radio fog produced by plasma filaments, which has reached a natural isotropic thermal equilibrium of just under 3K. The radiation is simply starlight that has been absorbed and re-radiated, and echoes the anisotropies of the world around us. These findings correlate with the results of a number of other independent studies, including that of Larson and Wandelt at the University of Illinois, and also of former Cambridge *enfant terrible* and current Imperial College theoretical physics prodigy, Professor João Magueijo. Quote from Starkman: "*This suggests that the reported microwave background fluctuations on large angular scales are not in fact cosmic, with important consequences*". Phew!

The final day saw us discussing viable alternative cosmologies, and here one inevitably leans towards personal preferences. My own bias is unashamedly towards scientists who adopt the classical empirical method, and there is no better example of this than Swedish plasma physics pioneer and Nobel laureate Hannes Alfven. Consequently, I favoured the paper on Plasma Cosmology presented by Eric Lerner, and as a direct result of that inclination find it very difficult here to be brief! Lerner summarised the basic premises: most of the Universe is plasma, so the effect of electromagnetic force on a cosmic scale is at least comparable to gravitation. Plasma cosmology assumes no origin in time for the Universe, and can therefore accommodate the conservation of energy/matter. Since we see evidence of evolution all around us, we can assume evolution in the Universe, though not at the pace or on the scale of the Big Bang. Lastly, plasma cosmology tries to explain as much of the Universe as possible using known physics, and does not invoke assistance from supernatural elements. Plasmas are scale invariant, so we can safely infer large-scale plasma activity from what we see terrestrially. Gravity acts on filaments, which condense into "blobs" and disks form. As the body contracts, it gets rid of angular momentum which is conducted away by plasma. Lerner's colleague Anthony Peratt of Los Alamos Laboratory modelled plasma interaction on a computer and has arrived

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Schedule of Presentations

Name	Location	Paper Title
Antonio Alfonso-Faus aalfonsofaus@yahoo.es	Madrid Polytech. Univ., Spain	Mass boom vs Big Bang
Carrol Alley coalley@physics.umd.edu	Univ. of Maryland, USA	Going "beyond Einstein" with Yilmaz theory
José Almeida bda@fisica.uminho.pt	Universidade do Minho	Geometric drive of Universal expansion
Thomas Andrews tba@xoba.com	USA	Falsification of the expanding Universe model
Yurij Baryshev yuba@astro.spbu.ru	St. Petersburg Univ., Russia	Conceptual problems of the standard cosmological model
Yurij Baryshev yuba@astro.spbu.ru	St. Petersburg Univ., Russia	Physics of gravitational interaction
Alain Blanchard alain.blanchard@ast.obs-mip.fr	Lab. d'Astrophys. Toulouse, France	The Big Bang picture: a wonderful success of modern science
M. de Campos campos@dfis.ufrr.br	Univ. Federal de Roraima, Brazil	The Dyer-Roeder relation
George Chapline chapline1@llnl.gov	Lawrence Livermore National Lab., USA	Tommy Gold revisited
Mike Disney mike.disney@astro.cf.ac.uk	Univ. of Cardiff, Great Britain	The insignificance of current cosmology
Anne M. Hofmeister and R. E. Criss hofmeist@wustl.edu	Washington Univ., USA	Implications of thermodynamics on cosmologic models
Michael Ibison ibison@earthtech.org	Inst. for Adv. Studies, Austin, USA	The Yilmaz cosmology
Michael Ibison ibison@earthtech.org	Inst. for Adv. Studies, Austin, USA	The steady-state cosmology
Michael Ivanov ivanovma@gw.bsuir.unibel.by	Belarus State Univ., Belarus	Low-energy quantum gravity
Moncy John moncyjohn@yahoo.co.uk	St. Thomas College, India	Decelerating past for the Universe?
Christian Joos and Josef Lutz jooss@ump.gwdg.de; josef.lutz@etit.tu-chemnitz.de	Univ. of Göttingen; Chemnitz Univ., Germany	Quantum redshift
Christian Joos and Josef Lutz jooss@ump.gwdg.de; josef.lutz@etit.tu-chemnitz.de	Univ. of Göttingen; Chemnitz Univ., Germany	Evolution of Universe in high-energy physics
S. P. Leaning		High redshift Supernovae data show no time dilation
Eric Lerner elerner@igc.org	Lawrenceville Plasma Physics, USA	Is the Universe expanding? Some tests of physical geometry

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Schedule of Presentations (*continue*)

Eric Lerner elerner@igc.org	Lawrenceville Plasma Physics, USA	Overview of plasma cosmology
Sergey Levshakov lev@astro.ioffe.rssi.ru	Ioffe Phys. Tech. Inst., St. Petersburg, Russia	The cosmological variability of the fine-structure constant
Martin López-Corredoira martinlc@iac.es	Inst. de Astrofísica de Canarias, Spain	Research on non-cosmological redshifts
Oliver Manuel om@umr.edu	University of Missouri, USA	Isotopes tell Sun's origin and operation
Jaques Moret-Bailly Jacques.Moret-Bailly@u-bourgogne.fr	France	Parametric light-matter interactions
Frank Potter and Howard Preston drpotter@lycos.com	Univ. of California; Preston Research, USA	Large-scale gravitational quantisation states
Eugene Savov eugenesavov@mail.orbitel.bg	Bulgarian Acad. of Sciences	Unique firework Universe and 3-D spiral code
Riccardo Scarpa rscarpa@eso.org	European Southern Observatory, Chile	Modified Newtonian Dynamics: alternative to non-baryonic dark matter
Riccardo Scarpa, Gianni Marconi, and Roberto Gilmozzi rscarpa@eso.org; gmarconi@eso.org; rgilmozz@eso.org	European Southern Observatory, Chile	Using globular clusters to test gravity
Donald Scott dascott2@cox.net	USA	Real properties of magnetism and plasma
Franco Selleri Franco.Selleri@ba.infn.it	Università di Bari, Italy	Absolute simultaneity forbids Big Bang
Glenn Starkman starkman@balin.cwru.edu	Case Western Reserve Univ., USA	Is the low-lambda microwave background cosmic?
Glenn Starkman starkman@balin.cwru.edu	Case Western Reserve Univ., USA	Differentiating between modified gravity and dark energy
Tuomo Suntola tuomo.suntola@sci.fi	Finland	Spherically closed dynamic space
Francesco Sylos Labini	E. Fermi Centre, Italy	Non-linear structures in gravitation and cosmology
Y. P. Varshni ypvsj@uottawa.ca	Univ. of Ottawa, Canada	Common absorption lines in two quasars
Y. P. Varshni, J. Talbot and Z. Ma ypvsj@uottawa.ca	Univ. of Ottawa; Chin. Acad. of Sci. (China)	Peaks in emission lines in the spectra of quasars
Thomas van Flandern tomvf@metaresearch.org	Meta Research, USA	Top problems with Big Bang: the light elements
Mogens Wegener mwegener@aarhusmail.dk	University of Aarhus, Denmark	Kinematic cosmology
Huseyin Yilmaz	Princeton Univ., USA	Beyond Einstein

at a compelling simulation of the morphogenesis of galaxies. Since plasma cosmology has no time constraints, the development of large-scale structures — so problematic for Big Bang — is accommodated. Lerner admits that there's still a lot of work to be done, but with the prospect of more research funding coming our way, he foresees the tidying up of the theory into a workable cosmological model.

Dr. Alain Blanchard of the Laboratoire d'Astrophysique in Toulouse had come to CCC-1 explicitly to defend Big Bang, and he did so admirably. My fears that the inclusion of a single speaker against the motion might amount to mere tokenism were entirely unfounded. Despite the fact that many of us disagreed with much of what he said, he acquitted himself most competently and I would say ended up making a number of good friends at the conference. Two quotes from Dr. Blanchard: "*We are all scientists, and we all want to progress. Where we differ is in our own prejudice*." "*When you do an experiment, you can get a 'yes' or 'no' answer from your equipment. When you work with astrophysical data, you are dealing with an altogether more complex situation, infused with unknowns*."

No account of CCC-1 would be near complete without a summary of a paper that caught all of us by complete surprise. Professor Oliver Manuel is not an astronomer. Nor indeed is he a physicist. He is a nuclear chemist, chairman of the Department of Chemistry at the University of Missouri, and held in high enough esteem to be one of a handful of scientists entrusted with the job of analysing Moon rock brought back by the Apollo missions. His "telescope" is a mass spectrometer, and he uses it to identify and track isotopes in the terrestrial neighbourhood. His conclusions are astonishing, yet I can find no fault with his arguments. The hard facts that emerge from Professor Manuel's study indicate that the chemical composition of the Sun beneath the photosphere is predominantly iron! Manuel's thesis has passed peer review in several mainstream journals, including *Nature*, *Science*, and the *Journal of Nuclear Fusion*. He derives a completely revolutionary Solar Model, one which spells big trouble for BBN. Subsequent investigation has shown that it is likely to represent a major paradigm shift in solar physics, and has implications also for the field of nuclear chemistry. He makes the following claims:

1. The chemical composition of the Sun is predominantly iron.
2. The energy of the Sun is *not* derived from nuclear fusion, but rather from neutron repulsion.
3. The Sun has a solid, electrically conducting ferrite surface beneath the photosphere, and rotates uniformly at all latitudes.
4. The solar system originated from a supernova about 5 billion years ago, and the Sun formed from the neutron star that remained.

Manuel's study contains much more than the sample points mentioned above. Data freely available from NASA's SOHO and TRACE satellites graphically and unambiguously support Manuel's contentions (to the extent of images illustrating fixed surface formations revolving with a period of 27.3 days), and suggest that the standard Solar Model is grossly inaccurate. The implications, if Manuel's ideas are validated, are exciting indeed. His words: "*The question is, are neutron stars 'dead' nuclear matter, with tightly bound neutrons at minus 93 MeV relative to the free neutron, as widely believed? Or are neutron stars the greatest known source of nuclear energy, with neutrons at plus 10 to 22 MeV relative to free neutrons, as we conclude from the properties of the 2,850 known isotopes*?"

The conference concluded with a stirring concert by a 3-piece baroque chamber music ensemble, and it gave me cause to reflect that it appeared that only in our appreciation of music did we find undiluted harmony. That the Big Bang theory will pass into history as an artefact of man's obsession with dogma is a certainty; it will do so on its own merits, however, because it stands on feet of clay. For a viable replacement theory to emerge solely from the efforts of the Alternative Cosmology Group is unlikely unless the group can soon find cohesive direction, and put into practice the undertaking that we become completely interdisciplinary in our approach. Nonetheless, that there is a crisis in the world of science is now confirmed. Papers presented at the conference by some of the world's leading scientists showed beyond doubt that the weight of scientific evidence clearly indicates that the dominant theory on the origin and destiny of the Universe is deeply flawed. The implications of this damning consensus are serious indeed, and will in time fundamentally affect not only the direction of many scientific disciplines, but also threaten to change the very way that we do science.