

Cosmological evidence that the turbulence problem is solved

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Abstract¹

Telescopes in all frequency bands indicate that the classical “turbulence problem” is finally solved, and that the solution is supported by all laboratory, oceanographic, atmospheric, astronomical, astrophysical and cosmological observations. The proposed solution is revolutionary in many areas, from fluid mechanics to biology and particle physics, and is both comprehensive and concise. Turbulence is turbulence from the beginning. Cosmology models must be revised back to the time of the hot big bang and magnetic monopoles. Turbulence must always be defined by the inertial vortex force $v \times w$ so that the cascade of turbulent kinetic energy is always from small scales to large, contrary to the standard turbulence assumption of Taylor-Richardson-Lumley that the turbulence cascade is from large scales to small or is indeterminate. Universal similarity theories of turbulence and turbulent mixing are explained by rejecting the failed idea of collisionless fluid mechanics, starting with Planck scales of temperature, length, time and entropy. Misconceptions such as cold dark matter, black holes, massive stars, “inverse” cascades and dark energy are dispelled. The 2011 Nobel prize in physics is falsified. The dark matter of galaxies is predicted and observed to be PGC (proto-globular-star-cluster) clumps of $> 10^{12}$ Schild (1996) earth-mass dark matter rogue planets, Gibson (1996). All stars form by mergers of planets within PGC clumps (eg: Pleiades, Subaru) that are interpreted as Jeans-mass proto-galaxies formed at 0.03 Myr during the plasma epoch along big bang fossil turbulence vortex lines. Stars and first life formed soon after the plasma gas transition at 0.3 Myr, hosted by the $> \sim 10^{80}$ Schild-Gibson life-infested water planets produced by the big bang, and dispersed on cosmic scales by Wickramasinghe cometary panspermia as explained in journalofcosmology.com.

Introduction

Modern computers and space telescopes now produce observations that falsify standard fluids, biological and cosmological models that have persisted for decades, hundreds and sometimes thousands of years. For example, from observations we see that all RNA-DNA life has been homogeneous, isotropic, and extraterrestrial

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<http://users.ictp.it/~tmb/main2017/abstract.html>

since ~ 2 Myr when water first condensed on the dark matter planets. The standard model of cosmology Λ CDMHC is based on faulty physics and fluid mechanics and is therefore quite misleading and completely obsolete. The cosmological constant Λ is zero and CDM and HC utterly false. Λ CDMHC wrongly assumes that fluid mechanical concepts of molecular viscosity and turbulence can be replaced by the collisionless Boltzmann equation. Likewise, standard models of thermodynamics such as the second law are wrongly assumed to be irrelevant to cosmology. Magical ideas such as dark energy, black holes, and an accelerating expansion of the universe with unbounded gravitational and kinetic energy are wrongly taken to be true and rewarded with several Nobel prizes. In fact, Λ CDMHC cosmology is NOT true if observations from modern space and ground-based telescopes are believed.

The Einstein cosmological constant Λ is zero and the CDMHC concepts are null and misleading. There is not now and never has been any cold dark matter (CDM) or hierarchical clustering (HC) of CDM "seeds". These myths must go the way of the flat earth. Black holes are myths, replaced by Schild-Leiter (2010) MECOs. Turbulence defined by v_{xw} lift forces cannot ever be ignored, and dominates the formation of the universe from the Planck time scale at $\sim 10^{-43}$ s to this day at $\sim 10^{18}$ s. Dark matter of galaxies is composed of 10^{80} "primordial fog particle" (PFP) 10^{24} kg \sim earth-mass planets that condensed in 10^{36} kg clumps of more than a trillion at $\sim 10^{13}$ s when the hot plasma of the big bang became gas. Within PGCs these H-⁴He planets merge to make larger planets and the first stars with the fossil turbulence density ρ_0 existing at 10^{12} s. Figure 1 shows a radio telescope view of the interior of the PGC that contains the earth and the sun, illuminated by our numerous identical surrounding pulsars. Remarkably, all PGCs have the same mass, the same density ρ_0 and the same size, which would be impossible by the intermittent, collisionless, Λ CDMHC model. The Oort cavity scale of star formation $\sim 10^{16}$ m is manifested by the change of slope of the blue and green dashed lines, and shows most stars are binaries and have \sim binary solar mass from binary planet mergers.

All stars form by binary mergers of these rogue dark matter planets within their PGC clumps. The time to form a star is the gravitational free fall time $(\rho G)^{1/2}$ of the interstellar medium, with density $\rho \sim \rho_0$ and Newton's gravitational constant G , giving ~ 0.3 Myr, not 300 Myr assumed by Λ CDMHC as the dark ages period where no stars or planets can exist. The dark ages is another myth of astrophysics, astronomy, and cosmology communities, caused by failures to understand or accept modern fluid mechanics and modern turbulence theory. Numerical simulations of collisionless fluid mechanics require > 400 Myr to make ~ 8 planets per star, not the $\sim 30,000,000$ dark matter planets per star estimated from observations and the u_{xw} turbulence theory presented here.

The great power law on the sky, showing 11 decades of electron density mixed by turbulence

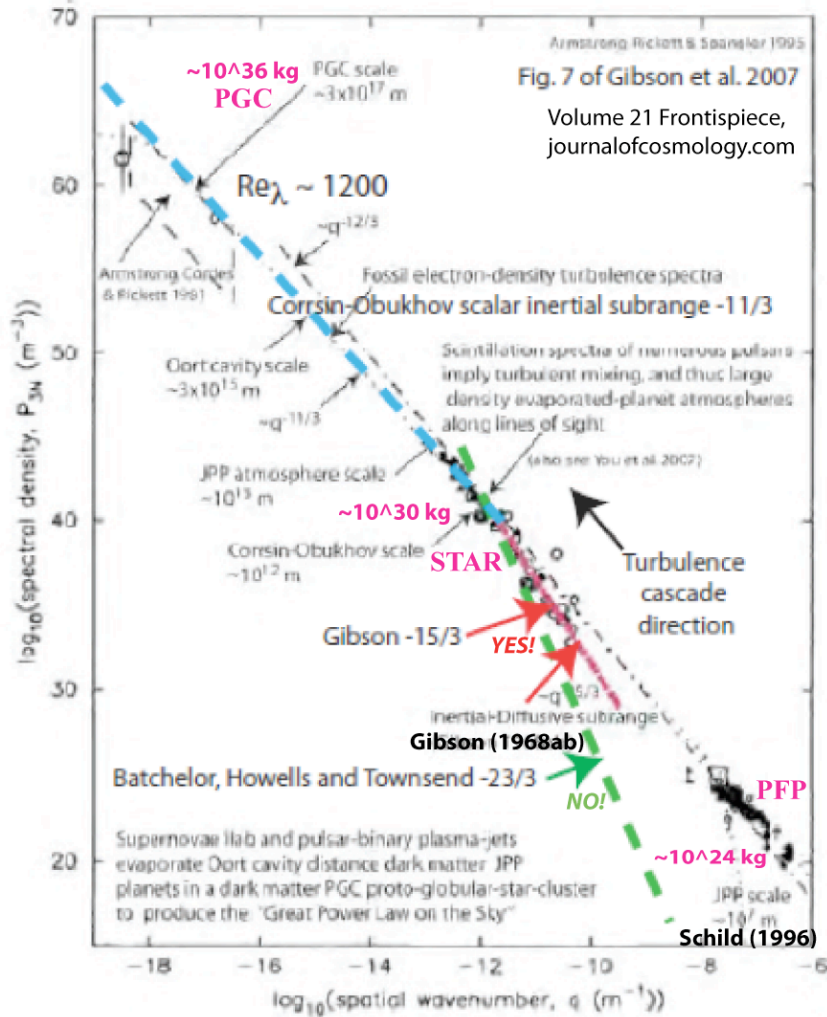
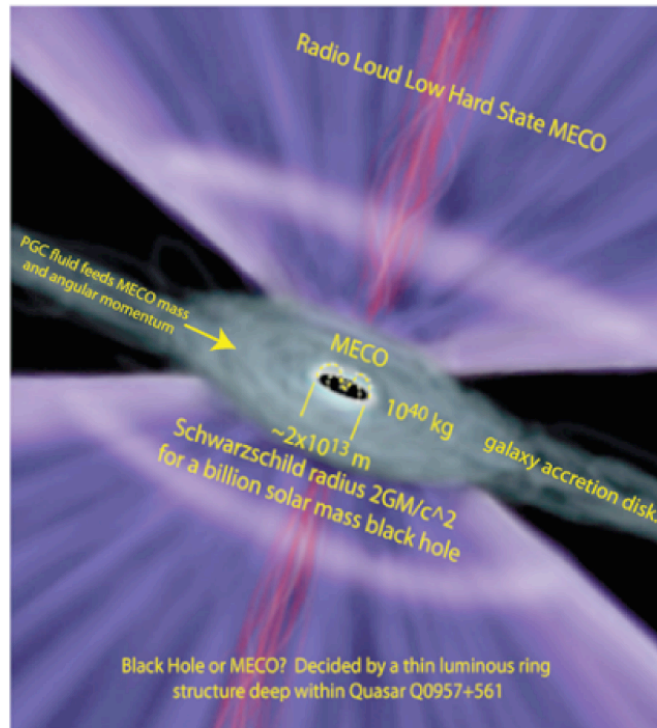


Figure 1. The great power law on the sky (Armstrong-Coles-Rickett 1991) shows turbulent mixing on proto-globular-star-cluster scales. Pulsars are formed by supernova II events at 10^7 m scales of PFPs. Turbulence forms in the interstellar medium that mixes electron density from these small scales to stars and the larger size of the PGC, which is 3×10^{17} m, or 11 decades, giving a spectacular demonstration of universally similar Kolmogorovian turbulent mixing theories such as Corrsin-Obukhov-Batchelor-Gibson (dashed blue). The observations contradict the $(-23/3)$ Batchelor, Howells and Townsend power law (dashed green) in favor of the $-15/3$ power law predicted by Gibson (1968ab) (dashed red).

Figure 1 shows that the cascade of turbulence is NOT from large scales to small but instead is from the small $\sim 10^7$ m scales of the supernova II events where stars implode and spin up to make the many identical pulsars observed by radio telescopes within the universally observed $\sim 10^{18}$ m PGC diameter, following universal turbulent and fossil turbulence similarity laws manifested in the interstellar medium surrounding the earth by (blue, red, green) power law subranges of the electron density mixed by turbulence.

Artist conception of a MECO (Magnetic [Magnetospheric] Eternally Collapsing Object), from R. E. Schild and D. J. Leiter (2010), *Journal of Cosmology*, Vol. 6, pp. 1400-1437, Fig. 7



A billion solar mass MECO draws in PGC dark matter planet clumps through an accretion disk.

Figure 2. Artist conception of a billion solar mass MECO from the center of a galaxy. It is not a black hole because it has a magnetic moment, as shown by Schild using careful observations of Quasar Q957+561 from Schild (1996). It produces powerful radiation along the axis of rotation using the spin and mass energy of the turbulent PGC fluid that enters the MECO on the central accretion disk. PGCs serve as collisional fluid particles for such AGN (active galactic nucleus) MECOs. Quasars are bright from MECOs, not black holes.

Theory

Turbulence is defined as an eddy-like state of fluid motion, where the inertial vortex forces $u \times w$ of the eddies are larger than any other forces that tend to damp the turbulent eddies out. This is the solution of the “turbulence problem”, described by Nobel Prize winner Richard Feynmann as the most difficult and important unsolved problem of classical physics. From this simple definition it follows that the mechanism of the turbulence cascade must always be from small scales where vorticity w is formed at Kolmogorov scales, to larger scales such as the Ozmidov scale, where turbulence fossilizes due to buoyancy forces. Viscous forces match $u \times w$ forces at a universal critical Reynolds number at the Kolmogorov scale. It is easy to show that adjacent, identical, vortex lines of the same sign, such as those in a developing boundary layer, will merge to form larger vortices of the same sign if slightly perturbed toward each other. Adjacent vortices of opposite sign repel each other by $u \times w$ forces and translate away from the source of the vorticity, accounting for the separation of turbulent boundary layers from rigid walls.

Figure 3 shows a model for the first MECO from Volume 26 of journalofcosmology.com using Guth magnetic monopoles and graviton turbulence as the mechanism for the formation of the $\sim 10^{53}$ kg mass-energy of the universe.

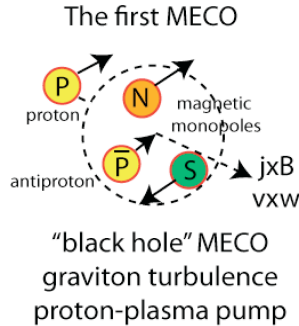


Figure 3. Rotating monopolium pairs of North and South magnetic monopoles produce large negative pressures in the direction perpendicular to the N-S plane of rotation that extract Proton-Antiproton-Plasma (PAP) jets from the vacuum during the big bang event. The magneto-hydrodynamic $j \times B$ forces are aligned with the $v \times w$ forces of graviton turbulence. This is the "inflation" mechanism of the big bang event, and occurs before the strong force freezeout at 10^{-27} s, when quarks and gluons appeared. Magnetic monopoles (Guth) require big bang conditions. This first MECO shows the black hole concept is always unnecessary. Black holes have never existed at any time or at any scale.

Gravitons have been recently been shown to exist, and have 8 times the spin of any other fundamental particle. Graviton turbulent diffusion produces the spin of all objects resulting from the big bang, including the first MECOs, pulsars, the sun and the earth.

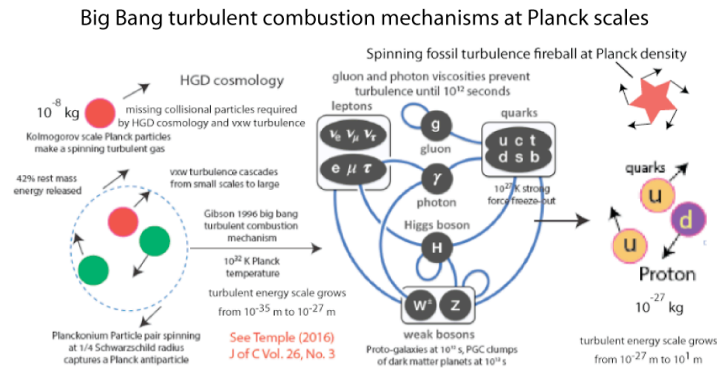


Figure 4. The big bang event was hot $\sim 10^{32}$ K and turbulent under Planck conditions where general relativity meets quantum mechanics to produce 10^{-8} kg Planck particles (red) and Planck antiparticles (green) that form Planckonium pairs similar to the positronium pairs of electrons and positrons that power supernova II events, where most of the energy released is that of neutrinos, not photons. Using the Kerr metric for rotating systems, 42% of the rest mass energy of a prograde Planck antiparticle accretion is available to produce more Planck particles, which will become turbulent because the Reynolds number is above critical. Thus, the process is turbulent combustion that produces a turbulent gas of Planck particles with a slight excess of matter instead of antimatter. Only $< 10^{-27}$ kg magnetic monopoles are possible before the combustion is quenched at $\sim 10^{10}$ K by quarks and gluon viscosity as the PAP jets of protons and antiprotons from MECOs appear. The

spinning red star fireball at Planck density is 1-10 m diameter to supply the $\sim 10^{53}$ kg of mass energy produced by the big bang.

Observations

Because the new theory of turbulence includes universal Kolmogorovian similarity of the turbulence and Obukhov-Batchelor-Gibson universal similarity of its turbulent mixing, it is difficult to prove the theory from observations since a single measured departure from predictions is sufficient to falsify the theory. The range of length scales is from the Planck length 10^{-35} m to the observable horizon $> 10^{26}$ m, or > 90 decades. So far, no departures from the theory have been found.

The most telling cosmological observations of the twentieth century are those of Schild (1996), where gravitational microlensing of the bright light of a quasar reveals the mass of a galaxy on a precise line of sight to the earth is dominated not by stars but by 10^{24} kg dark matter planets, as independently predicted by Gibson (1996). The twinkling frequency of the light is weeks rather than years if the galaxy mass is due to stars rather than planets. These observations have been reproduced.

Signatures of big bang turbulence and plasma turbulence emerge from Planck Collaboration

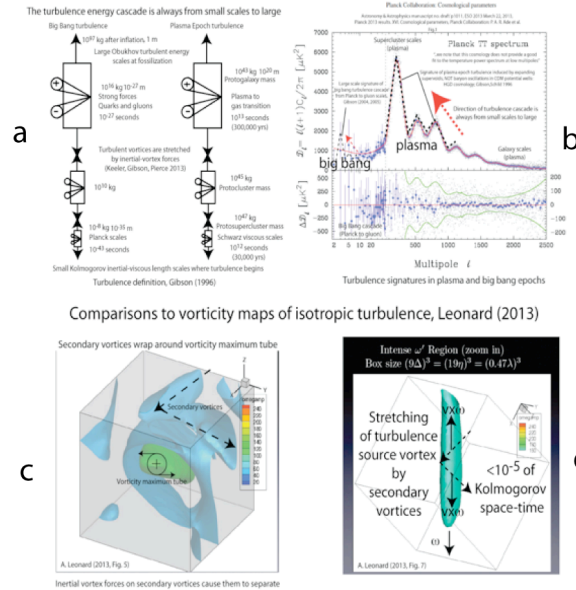


Figure 5. Spinning vortex lines **a**, produce turbulence with characteristic triple peak signals, as seen in the Planck Collaboration 1977 spectrum **b**. On the left side of the **b** spectrum the fossil turbulence vortices are from the big bang turbulence, and on the right side they are from proto-galaxy fluid turbulence in the plasma epoch at 30,000 years. The same patterns are seen in vorticity maps of Leonard (2013) in **c**, and **d**, from Kolmogorov scale numerical simulations.

Discussion

Numerous observational tests have been made of the Gibson (1996) turbulence theory, and so far no observational conflicts have been reported. New space and improved ground based telescopes are continually being added in the earth solar

system to extend the already large set of data. Thousands of exoplanets are now known. Life has been found in the ~300 kg ice meteorite that recently landed in Port Sanilac Michigan **a**, Snyder (2017), apparently from one of numerous gravitationally fragmenting ice comets observed near the sun and Jupiter. These comets probably supply most of the water and life of our planets and moons. Examination of the melting pieces shows the object is from a life-infested extraterrestrial frozen ocean. Catastrophic equatorial icing fails at Port Sanilac (43 N).

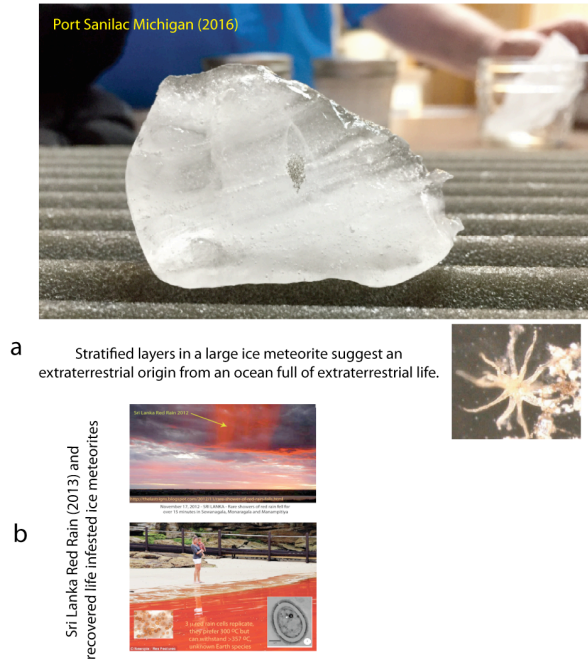


Figure 6. This ~ 10 kg ice meteorite **a** shows stratified layers of a high pressure ocean with bent bubbles and mm scale life forms. At some point the high bubble pressure turns it to slush rather than melting. See volume 21 of the journalofcosmology.com for images and discussion of red rain extraterrestrial life **b**. Red rain events are documented in the Bible.

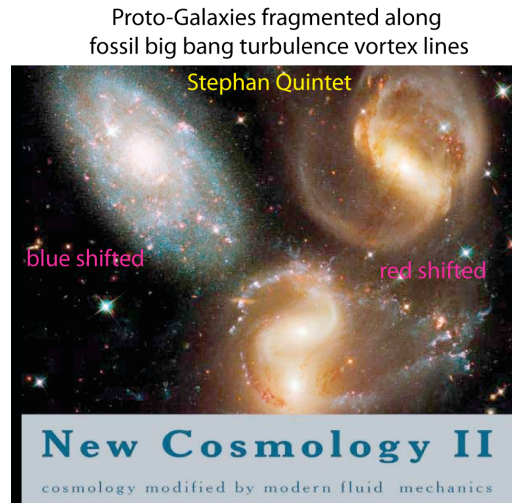


Figure 7. A spectacular result from the Hubble Space Telescope ultra deep field was the observation of “chain galaxies” with several 10^{20} m bright objects in linear chains. From modern fluid mechanics these objects are identified as 10^{43} kg proto-galaxies fragmented along big bang turbulence vortex lines by their large rates of strain and viscosity, with Nomura-Kolmogorov scales 10^{20} m and Nomura morphology. Stephan Quintet is an example of Hickson compact groups of such galaxies, fragmented along slim pencils with $\sim 10^3$ aspect ratios. Most Hickson compact groups have anomalous nearby galaxies such as the blue shifted galaxy shown.

Conclusions

The agreement of cosmological observations (Figs. 1, 5, 7) and Schild (1996) with predictions of Gibson (1996) vxw turbulence theory is excellent and extends laboratory and numerical evidence, as well as accumulating evidence of Hoyle-Wickramasinghe astrobology and cometary panspermia (Fig. 6ab). It is recommended that vxw turbulence and turbulent mixing also be accepted as presently confirmed observational facts of cosmology. The standard Λ CDMHC cosmology and the standard Taylor-Richardson-Lumley turbulence models are very different and must be replaced. Ignorance in these areas can be expensive, and even deadly as they were for the mystery plane MH370 (2014) and the Brazil Soccer team (2016) plane that both crashed at latitude 7 N.

References

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