

**THOMAS E. CHAMBERLAIN -- CV**

Thomas Chamberlain has been an independent research scientist in theoretical physics since ~1970 and in mathematical psychology and economics (applied psychology) since 1981. Over this interval until recently he was employed as an engineer at Boeing, Raytheon, and other aerospace companies.

In 1993 he finalized the canonical human behavior equation and in 1997 he began presenting papers at international economics conferences. His 2003 contribution “Does uneven expected risk promote poverty and instability?” provided the analytical basis or justification for international commerce damping and human recapitalization, two increasingly prominent 21st-century approaches for arresting and reversing the fateful concentration of wealth and income in a small percentage of the population. The related Discretionary-Power Principle of Justice was also introduced in the 2003 paper. More recently (2011) he has prepared a deeper mathematical system that unites neoclassical and Gossenian micro-economics, two systems in essential conflict since the Marginal Revolution of the 1870s.

In physics his studies over the years focused on conceptualizing relativity and quantum mechanics (to the extent either may be possible). In 2012 he decided to concentrate on basic physics—suspending psychology and economics—with the goal of eventually uniting anisotropic (light-velocity) relativity and quantum theory. Because orthodox relativity rejects anisotropic light-velocity this effort immediately concentrated on special relativity to the neglect of quantum theory. In 2014 special relativity (and therefore general relativity) was found incomplete due to the isotropic  $c$ =constant postulate. The resulting paper “Fundamentally anisotropic light-velocity at the foundation of classical physics” was presented at the 2015 June AAAS-PD conference in San Francisco. (Original title changed).

**Far-Field Gravitation**

On the basis of a belief, from well before 2012, that one-way (near) infinite light-speed

was crucially germane to deepening *classical* physics theory, almost immediately after the San Francisco conference (2015 July) he ascertained that Hubble expansion and Einstein's same-motion acceleration (1907) are essentially related (in some manner)—inasmuch as equating the Hubble expansion,  $V=rH$ , to the similar expansion from S-M acceleration (in the limit  $V=c$ ) with the latter as a free parameter

yielded  $a=cH=6.3E-10$  m/s<sup>2</sup>,

which is within an order of Milgrom's universal acceleration constant  $a_0$

$$a_0 = 1.2E-10 \text{ m/s}^2$$

.

Another nearly seven months (to 2016 February) were required to place Milgrom's empirical Deep MOND on a relativistic basis (i.e., within "state-of-art" relativity physics, which extends standard relativity physics to formally recognize anisotropic light-speed—see Rizzi et al. (2008) and the AAAS-PD/San Francisco paper). Two new inductive advances enabled this theoretical advance: (1) conjunction of one-way infinite light-speed and the Hubble expansion to yield the corresponding time dilation; followed by (2) combining this time-dilation with its counterpart emerging from the Schwarzschild solution. The result was the relationship  $V_L^2 = 2(GM/r)^{1/2}$  (s)

$$(r$$

$$H$$

$$cH$$

$$0$$

$$)$$

$$1/2$$

— departing from Milgrom's functionally similar  $V_f$

$$2$$

$$=(GMa$$

$$0$$

$$)$$

$$1/2$$

by the Schwarzschild-based radius  $r_s$

$$s$$

and the Hubble-expansion based  $r_H$

$$H$$

, which, being equal, cancel out.

(Note that  $V_L$

$$L$$

is not Milgrom's circular orbit speed  $V_f$

$$f$$

but rather the (also invariant) speed emerging from the linearized Lorentz transformation. The

factor “2” had been mistakenly overlooked and was inserted as part of the previous revision on March 29, 2017.)

Further developments over the next few months towards a complete deepening of the Einstein Field Equations were eventually suspended in order to prepare for the rapidly approaching AAAS-PD Conference in San Diego (14-17 June 2016), where the approximate formulation of Milgrom’s expression with comparison against astronomical “far-field” star and gas velocities was presented.

### **Accommodation of Far-Field Gravitation in the Schwarzschild Solution**

The principal task in allowing completion of the paper has been establishing how the inverse-radius dependence of far-field gravitation emerges from the invariant far-field time-dilation  $d(\Delta t)/dt = -(GM/cH_0)^{1/2}/c^2$ , a continuing task that began with the relation’s origination in 2016 February and was finally achieved in early November. Steady, non-accelerating Hubble expansion was the key permitting

$$a = d[(GM/r_S)(r_H c H)]^{1/2}/dr = -\frac{1}{2} (GM/cH_0)^{1/2}/r \text{ while } d[(GM/r_S)(r_H c H)]^{1/2}/dr = 0.$$

(Note that the factor “1/2” was initially overlooked and inserted as part of the previous revision on March 29, 2017. A significant consequence of this correction was a much-improved correspondence or agreement between Milgrom’s  $a_0 = 1.2E-13 \text{ km/s}^2$  and the present  $cH_0/4 \approx 1.6E-13 \text{ km/s}^2$ .)

Additional concerns delayed the paper, but it was completed soon before traveling to the AAAS-PD conference in Hawaii with presentation on 22 June. The paper may be accessed in the “Selected Physics Papers” of this website.

## **Dark Energy and Cosmic Acceleration**

Milgrom's *universal acceleration constant* is germane to both "dark matter" and "dark energy", and we should expect follow-on insight into the latter problem. Here the salient factors are: (1) (inwardly singularly) anisotropic light speed; and (2) Hubble space expansion. Each factor by itself is of no (immediate) scientific consequence, but taken together they give "empirical traction" that helps resolve both problems. Cosmic acceleration, in particular, may be related to time-dilation with increasing lookback-distance due to (again singular) anisotropic light speed within the Hubble flow. An initial presentation of this advance is scheduled for the

29

th

*International Texas Symposium on Relativistic Astrophysics*

in Cape Town (2017 December), with the corresponding paper completed in 2018.

## **ACADEMICS AND CHRONOLOGY**

### **EDUCATION**

PhD, University of California, Berkeley, 1972.

MS, Massachusetts Institute of Technology, 1966.

BS, Boston University, 1961

### **ENDEAVOR:**

Research scientist in physics, psychology, and economics.

**CHRONOLOGY:** 1970 (Approx.): Initiated independent study of relativity and quantum mechanics.

1981: Initiated independent study of mathematical behavior and economics.

1993: Completed the canonical Gossen Equation representing the individual's subjective-utility based expectational plan.

1997: Initial presentation at an international economics conference of the "instant-utility" approach to mathematical behavior/economics. (72nd annual conference of the Western Economics Association International conference, Seattle.)

2003: Initial presentation of the theory-based poverty-reduction recommendations and the Discretionary-Power Principle of Justice (5th Pacific Rim Allied Organizations Conference, Taipei.)

2005: Initial statement recognizing the permanent nuclear detente between great powers with its potentially beneficial effect on economic development. (6th Pacific Rim Allied Organizations Conference, Hong Kong.)

2005: Addressed the pre-eminence of poverty-reduction versus social and economic rights. (61st International Atlantic Economic conference, Berlin; later presented at the 47th Congress of the European Regional Science Association, Paris.)

2006: Addressed how socialism and capitalism may be united in the goal of reversing and defeating poverty. (62nd International Atlantic Economic Conference, Philadelphia; later presented at the 7th Pacific Rim Allied Organizations Conference, Beijing)

2007: Extended the minimum wage scope to include human recapitalization as a necessary step for defeating poverty. (64th International Atlantic Economic Conference; Savannah,

Georgia.)

2008: Recommended for a lasting détente that the West should promote international-commerce damping and human recapitalization as its domestic/international policy while the East should make accommodating adjustments. (65th International Atlantic Economic Conference, Warsaw.)

2009: Further recommendation of the alternative of human recapitalization and international commerce damping as a revision or improvement of the (now receding) Washington Consensus. (67th International Atlantic Economic Conference, Rome.)

2009: Letter-critique of mainstream economics published in the Financial Times (27 April), with recommendation for deeper knowledge to promote wellbeing and socioeconomic stability.

2009: Letter published in the Financial Times (18 December) on the crucial need for competent and true mathematical economics to help defeat poverty and achieve a sustainable world.

2010: Prepared historical overview of the development of the Gossenian approach to mathematical economics along with the application of this approach towards understanding and reversing poverty. (69th International Atlantic Economic Conference, Prague.)

2011: Introduced a new constraint on the neoclassical utility function thereby uniting neoclassical and Gossenian theory and opening the door for conciliation of the Austrian and neoclassical traditions. As applications, Walras's substitution equations are completed and marginal productivities of capital and labor are functionally related to intertemporal discounting. (71st International Atlantic Economic Conference, Athens.)

2012: Began intensive effort to arrive at a substantive understanding of relativity physics that accommodates anisotropic light-velocity.

2014: Recognized the fundamental nature of anisotropic light-velocity in classical physics leading to the multi space-time condition in accordance with the dichotomy between Einstein's light-pulse versus same-motion synchronization conventions.

2015: Completed the initial paper on the subject—"Fundamentally anisotropic light-velocity at the foundation of classical physics" (new title)—and presented at the 2015 June AAAS-PD conference in San Francisco.

2015 June: Initiated revision of general relativity to accommodate anisotropic light-velocity.

2016 February: Developed Milgrom's empirical  $V_f=(GMa_0)^{1/4}$  as theoretical  $V_L=2^{1/2}(GMcH_0)^{1/4}$  within up-to-date relativity physics. (Corrected

$V_f$   
 $= (GMa_0)^{1/4}$   
to  
 $V_L$   
 $= 2^{1/2} (GMcH_0)^{1/4}$   
in the prior revision.)

2016 June: Letter published in the Financial Times (2 June) recommending conditional basic income (properly done) to grow human capital thereby promoting "the basic economic right, the Right to Life", where the resulting boost to economic growth yields increased tax revenue to keep government finances in balance.

2016 June: Presented an approximate theoretical formulation of Milgrom's empirical Deep MOND at the annual AAAS-PD Conference (San Diego), which advances general relativity breakdown over dark matter as the explanation for "missing matter" throughout the cosmos.

2016 November: Recognized steady, non-accelerating Hubble expansion as the basis for mathematical derivation of far-field gravity (inserted factor  $\frac{1}{2}$  correction in the previous revision)

$$a = d([GM/r_S][r_HcH])^{1/2}/dr = - \frac{1}{2} (GMcH_0)^{1/2}/r,$$

while acknowledging

$$d([GM/r_S][r_HcH_0])^{1/2}/dr = 0,$$

thereby promoting a prospective metric for extending the Schwarzschild solution to accommodate inverse-r far-field gravity and clearing the path to completing the paper.

2017 January: Advanced the "either/or" correspondence between far-field gravity and (also relativistic) dark matter (in the sense of inducing non-uniform time-progression), where the former's closer association with GR suggests priority regarding follow-on progress (e.g., the new relationship in far-field theory between matter/energy and time-progression).

2017 June: Completed the "sub-field" gravitation paper and presented at the 98th annual AAAS-PD Conference in Hawaii. (The paper may be obtained on the "Selected Physics Papers" page.)



2017 September-October: The sub-field paper given in Hawaii is accepted for presentation at the *29th Texas Symposium on Relativistic Astrophysics* in early December (Cape Town, South Africa). Initial work on the dark energy problem as parallel or complementary to the sub-field theory is in accord with the expected cosmic acceleration for an empty universe. A synopsis of this progress is planned in the symposium talk.

2018 March: Hubble expansion acceleration for the empty universe ( $\Omega=0$  with  $dH/dt=0$ ) was presented as a new result at the Texas2017 symposium. Further developments since December that model (partially) offsetting pure cosmic acceleration versus sub-field cosmic deceleration in the local universe ( $z < \sim 0.1$ ) - with comparison versus Sn-1a apparent luminosity residuals - will be given at the APS April Meeting in Columbus.

2018 June: Progress on the nature of cosmic acceleration/deceleration was presented at the 2018 APS April Meeting in Columbus. Follow-on advances were given at the 2018 AAAS-PD Conference in Pomona, California, with the presentation title "Relativistic Formulation of Cosmic Acceleration vs. Cosmic Deceleration in the Local Universe." The corresponding abstract and charts are available on the Physics Page; completion of the "in progress" paper is expected later this year. (After intensive scrubbing/refinement, the Rev-1 charts are (finally) uploaded today--28 September 2018.)

2018 November: A more substantive derivation of cosmic acceleration entitled "Derivation of Cosmic Acceleration Given Anisotropic Light-Speed in the Hubble Expansion" yielding  $a_{CA}=rH_0^2$  to leading order was presented at the annual APS Far West Section meeting (Fullerton) on 19 October, showing good agreement with supernova SNe-Ia acceleration measurements in the local universe,  $0.01 < z < 0.3$ . The abstract and charts are available on the Physics Page. Work continues on the cosmic acceleration paper with completion pushed into early-to-mid 2019.

2019 September: The cosmic acceleration paper was completed mid-September, about six months later than was expected last year. A sufficiently concise mathematical demonstration

that light-speed is fundamentally anisotropic in all inertial frames—in addition to isotropic—was the last hurdle, with numerous other important/emergent concerns along the way. A preprint has been posted on ResearchGate and the Physics Page herein. Updating the galactic “missing matter” resolution based on recent developments is a prime item on the “to do” list.

2020 January: Presentation of the cosmic acceleration paper at the annual 2019 APS Far West Meeting at Stanford (1,2 November) was well received, but the paper itself was not accepted in its first submittal for publication. Two additional submittals in the near future are in the works. Meanwhile, the six year hold (to first address deeper [classical] gravity) has been lifted on applying infinite inward light-speed to quantum mechanics—e.g., to explain Einstein’s “spooky action at a distance” and how the “quantum eraser” experiment works in violation of the signal constraint—with one or more conference talks to be given later this year. Additionally, “Revised Schwarzschild Solution to Accommodate Space Expansion” is under significant deepening in light of the cosmic acceleration derivation and will be submitted for publication about midyear.

2020 April: Einstein’s non-local “spooky action” was addressed in the APS 2020 April (Virtual) Meeting by illustrating how singular light-speed (inward) at the idler detectors in the quantum eraser experiment retroactively signals the BBO via temporal disentanglement thereby determining the signal/target detector result. (Selected Physics Papers.) And near the end of April, Nature published the Correspondence “Revamp Economics for Global Fixes” offering that University economics should advance from the nineteenth century ‘marginal revolution’ to the present by accommodating basic temporal and expectational theory developed over the past 100+ years.

2020 September: Updated the 2017 “Revised Schwarzschild Solution to Accommodate Space Expansion” by inserting—among additional refinements—a leading order derivation of the Hubble parameter radial dependence for a fundamental observer comoving with the Hubble flow in close proximity to any given spiral galaxy (giving  $H = r_0 H_0 / r$ ), based on the recently derived cosmic acceleration (2019 September). Here the  $H$

=  
r  
0  
H

0  
/r relationship had previously been empirically inferred thereby supporting the derivation of subfield gravitation from the radial derivative of (spatially uniform) subfield time-dilation.

2020 November: Revised/refined the 2019 cosmic acceleration paper, concentrating primarily on a more detailed (Lorentz-transformation based) derivation of inward-infinite light-speed and the corresponding outward-subluminal light-speed. (Uploaded to "Selected Physics Papers" on November 15).