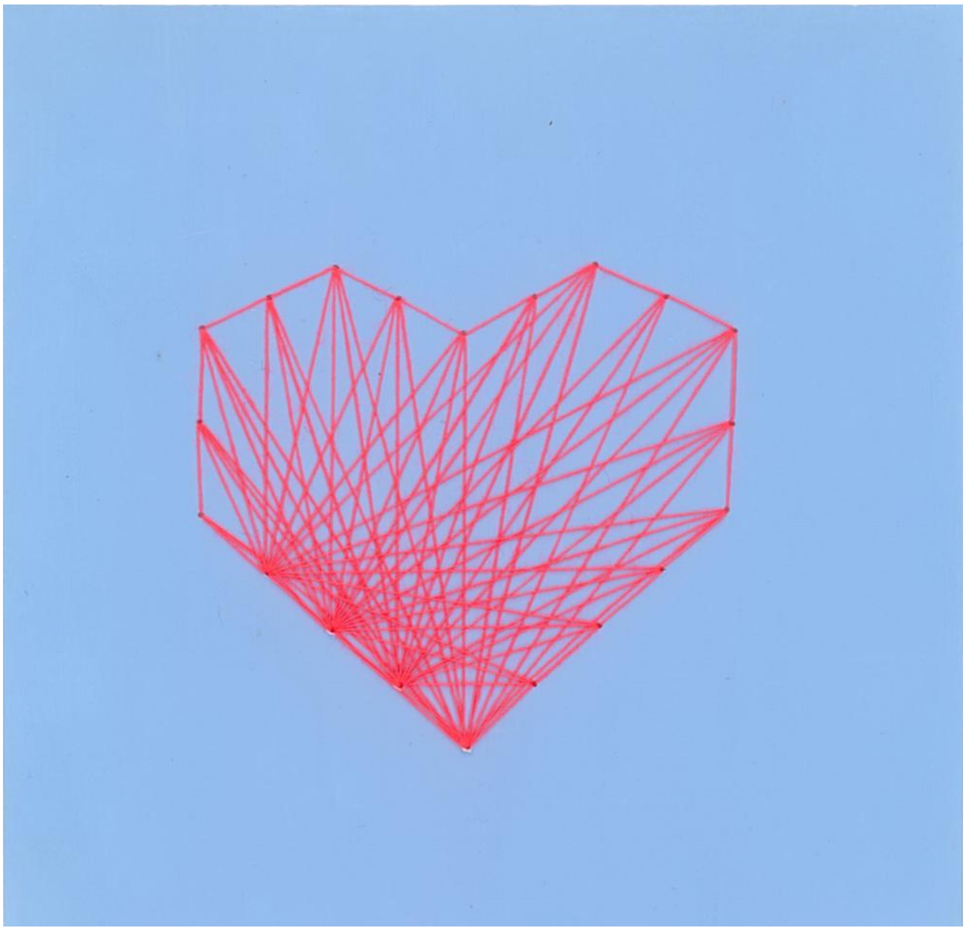
Investigations into universal physics

Parts I – III



Jim H. Adams and Graham Ennis

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Manifesto for a new physics

The danger to society is not merely that it should believe wrong things, though that is great enough, but that it should become credulous, and lose the habit of testing things and inquiring into them.

William Clifford (of Clifford algebras)

Physics as a forum for ideas is facing a number of trends blocking progress. Scholars teach theoretical physics in ever more elaborate language that inhibits thinking due to its remote abstraction, this language restricts access to the select few who accommodate to it, and one specialism may not speak to another. Moreover, uncomfortable facts are met with silence or denial, so that theory has sought divorce from experiments.

The adopted pioneers of science are the subject of a cult of personality which usually does not represent what they said, whereas others of note are airbrushed from history.

The student of today is well aware that the thinkers and experimenters of a thousand years ago or before did not have a grasp of true physics. We should also become aware that the contemporary theories of relativity and quantum mechanics are notions as defective as was the theory of epicycles describing the motion of the planets in classical Greek antiquity.

To describe new physics requires new mathematics. It needs to be conceptually simple and simply expressed. Above all, just as the differential calculus was needed to go beyond the physics of epicycle motion, physics needs to break free of the mathematical restrictions that limit its boundaries to the conventions of the present day.

Some of those seeking to understand scientific fact have become aware of a revolt against the state of affairs. We need to express new ideas which go against current trends, to develop persistent curiosity in seeking new understanding and testing it against experiment, and to listen to the opinion of engineers who understand the practicalities of the subject, what works, and what does not. *Investigations into universal physics* is a contribution to this programme.

The authors, the making of this work and the reader.

Investigations into universal physics was written by Jim H. Adams. Graham Ennis has been his principal advisor on the social background of science, most experimental results, their physical and philosophical basis, and whose life-long research is the origin of half its ideas.

Jim introduced himself to group theory and a theory of gravity known as general relativity at school. He is interested in theoretical physics, in particular quantum field theory, quantum thermodynamics, the de Broglie-Bohm interpretation of quantum mechanics, the historical development of unified field theories, quantum gravity, the standard model of particle interactions, and he has investigated a theory of everything by the physicist Burkhard Heim. He is working on research in pure mathematics, with interests in specific calculations for overarching theories of mathematics which is normally expressed abstractly, but for which he has used simple language to speak to a wide audience technically. This covers representations of matrices, number theory, polynomial equations, logic, ‘branched spaces’, mathematics beyond addition, multiplication and exponentiation to what is known as superexponentiation, a novel theory of infinities, and he is researching into ‘zeta functions’.

Graham Ennis is a technologist and experimentalist, focused on unorthodox physics and anomalous experimental results. His interests particularly include the researches of Tesla and advanced Maxwellian physics, with consequent extensions to field physics. Regarding ZPE (zero point energy) and quantum vacuum structure, he believes that eventually propulsion physics and systems, significant alternative energy physics and other practical applications may arise from them.

Of especial mention and more than an acknowledgement is the role of Dolores García in this work. As a reviewer she does not wish to be judged as an author, but her critical acumen from its inception has resulted in many improvements to the text that we would not otherwise have addressed properly and has greatly benefitted its reading public.

This work is written in a style that could be approached by an A-level student in mathematics and physics and is self-contained. Its language is as simple as possible without avoiding the technical. It is thus research which is free of jargon and which, if our intuition is correct, is incompatible with the elevated style of the academic journal system. Nevertheless, it is not entirely a review. Linkages to theories and their relationship to experiments are developed which to the best of our knowledge are nowhere to be found at this moment in other literature on the subject.

Our views on methodology.

The scientific methodology we are applying has the following features.

Our studies have employed an extensive literature search, including modern recording media.

We have avoided selection of ideas automatically according to collective wisdom. Our thesis is that a number of scientific results need reappraisal, both theoretically and in the design of new experiments or more detailed reconfirmations of old ones. Our project would serve its purpose had all results remained intact after this reappraisal, but that is not so. A revision of theory as profound as the Copernican revolution is available to us.

There is often a conventional wisdom which derives experimental results from theories. An objective is to review the most convincing accounts of the orthodox and merge them into a thorough experimental and theoretical description. We state the domains of applicability of experiments and the best accounts of these theories in a language that is as simple as possible, but not simpler than that. Consequences are derived rigorously.

We need to be aware, in terms of the history of the development of ideas, of reactions to dissident thinking, and social processes which lead ideas to become embedded in the teaching system. Nevertheless, a widely accepted scientific theory may generate a counterculture even when counterclaims on experimental data may not be acknowledged by the consensus as a possibility. Our objective is to search out, describe and investigate alternative accounts not often taught in the mainstream. Sometimes we find personal attacks by those upholding the system on the integrity of researchers and possibly allegations of fraud cut both ways. Whilst not denying the utility of theoretical prejudice, uncomfortable results which can originate from both within and outside the formal academic system can be dismissed in phrases like ‘That is very interesting. Now repeat the experiment’, even when the conclusion is very, very clear. Experimentalists who demonstrate counter results are sometimes criticised for their theoretical explanations, which may not, however, be relevant to the integrity of these results.

An objective is to classify and discuss the experimental and theoretical basis of these counterclaims, to determine the domains of applicability of such experiments and to search for theoretical explanations in which they can be accommodated. A further task is to integrate all theoretical explanations in an overarching account, and an additional objective is that this theoretical account should be compelling.

It is sometimes the case that counterclaims have a historical basis in the development of science which has later been abandoned under an accepted revolution. Our intention is to review the historical development of theory, opening up new possibilities which the central orthodoxies have not been entirely able to refute.

Having achieved this objective in the classification of what is already known, we will not have achieved our tasks unless we also develop our own account of theory and experiments. We have worked in stages, the experimental basis changing the theories, where mathematical modelling of these predicts experimental results which we wish to deny or confirm. The conclusions of this repeated interaction of the experimental and the theoretical have been used to modify the direction and content of our presentation, which adds coherence to it.

Experimental and theoretical results.

In terms of the theories and experiments we wish to discuss, *New physics* is divided into seven parts. Each part starts with a foreword discussing its experimental analysis and then at least one chapter on the mathematical basis for the investigations. The results for physical theory are derived using these mathematical structures. We investigate many possible and actual experiments lying within our theories and outside them. The topics discussed are special relativity, electromagnetism, relative and absolute quantum space (meaning quantum mechanics and the vacuum), quantum electrodynamics, relativistic gravity, the standard model, unification and finally we discuss other and nonstandard theories.

A major experimental aspect of our theory is that the energy of the ‘vacuum’ is stupendously large. This is in accordance with quantum theory as it currently stands. It was the point of view of Einstein that this energy is there, but its effects are unobservable. But we ourselves are saying that the energy structure of space-time is not completely stable, so that there exist states of the vacuum, absolute quantum space, which are not in equilibrium, and this energy can be accessible. There are many experimental results in this area which in conventional physics have no explanation, and are therefore deemed not to exist. The emphatic point of view promoted by one of the authors is that this energy can provide industrial-size energy production for the planet, and that systems can be developed to use these energies in propulsion systems. Furthermore, it is natural to state in this picture that the vacuum is not uniform over galactic distances, and that this could explain the apparent anomaly of ‘dark matter’.

We present a further predictive aspect in cosmology, so that we have a theory using novanion propagators, to be described later, which have nonconservation of energy at time zero, but conserve it thereafter, this describes via novanion multiplication the existence of distance in the world, including those of relativistic type, and that the existence of finitely built-up novanion states interacting via multiplication shows that the universe continues to explode at vast distances, which is in accordance with the negative curvature of the universe observed over these distances.

We also need to go into a little detail concerning obstructions to a revision of physics, how investigations may be carried out as a project, and how conventional interpretations may be compared with our own, both theoretically and directly by new experiments both by us and others who might wish to verify or disconfirm what we have to say.

The scientific culture of the 21st century affirms the success of its project, in the alignment of many theories centring around the ideas of relativity and quantum mechanics in accordance with a gigantic database of experimental fact.

Whereas these experiments may be interpreted by many theories as new findings are discovered at CERN, and there are a number of observational puzzlements, say in the theory of neutrino oscillations which indicates physics beyond the standard model, and in the status of galactic dark matter, it would appear at first sight that no theory properly formulated and in accordance with the facts could supplant the foundations of scientific investigations and results now in place.

Nevertheless our investigations into the quantum vacuum, which we call absolute quantum space, and a reappraisal of experimental results in relativity amounts to an upturning and a replacement of the orthodox view of physics by using novanion propagators in a coherent theoretical and philosophical framework agreeing with experiment.

The physics described here involves the interrelationships and unification of four theories or the models used to interpret them.

1. The idea of novanions.

The first is a purely mathematical theory: the theory of novanions. Novanions have a scalar component, which we identify with time, and a number of spacelike components. Novanions have a remarkable aspect: when the time component is not zero, there exist conservation laws in the novanion number system, but only when the time component is zero is number not conserved. Thus we have within a purely mathematical structure a description nowhere naturally occurring in other theories, that objects are created at time zero, and thereafter conservation laws of these objects apply; they cannot be annihilated.

Novanions are described in chapters XI and XVIII. They are noncommutative, meaning for two novanions A and B the product AB $\neq$ BA, and nonassociative; for three novanions A(BC) $\neq$ (AB)C. The conservation laws which apply to them only outside of time zero may be summarised in the idea that under this condition they form a division algebra.

Whole numbers are discrete, that is, there are finite numbers between them, although the set of them is infinite. Wedderburn’s little theorem states that every finite division algebra is commutative (meaning AB = BA). Thus novanionic physics cannot be finite, although it can be discrete, and if it is discrete, division could stop somewhere. A system with addition, subtraction and multiplication but not division is called a *ring*. We will treat novanion ring operations as fundamental. Space metrics and energy interactions will be derived from them.

Other noncommutative and nonassociative mathematical objects have the feature that after a period of time they may return to zero, that is, they may self-annihilate in a singularity.

A linkage between these ideas is that in the conservation region novanions preserve angles in transformations, in other words they are *conformal*, but other mathematical structures do not in general maintain angles under transformations; they are *nonconformal*.

Thus if we describe a universal physics using novanions, it will have the feature of creation from nothing at time $t = 0$, conservation (as we will see) of an energy-type equation, and the quantum theory using whole number states which we will derive from it will be conformal.

We will allow the sporadic creation of nonconformal mathematical structures, on the grounds that what is possible can be created, which may have more than one time component, but we will identify these with vacuum fluctuations: they are unstable. Thus what substantially remains is by an evolutionary process what is stable: novanions. From this point of view, the logic of what is possible contains within itself the structure of what exists.

2. The wavelet model.

The Copenhagen interpretation of quantum mechanics deals with entities which are either particles *or* waves, but in the interpretation of de Broglie and Bohm the entities are particles *and* waves. Wavelets extend the de Broglie-Bohm idea to a model where waves can be localised. Wavelets contain the idea of localisation of quantum systems and the integrability, meaning the states can be summed, of the propagators of its states. Then the Heisenberg uncertainty principle describing the incompatible simultaneous localisation of conjugate variables in a quantum system is directly expressible using the wavelet idea. So we have a model which describes localised states and is suitable for describing transformations of these states. Novanion wavelets can be incorporated in this model.

A state can be partitioned discretely, where each discrete component varies continuously over space-time. The discrete structure of space-time becomes a statistical property at less high resolution, and the wavelet idea is a suitable method for aggregated systems when continuity approximations combined with discrete structures are of interest.

3. Yang-Mills physics.

The third idea is the description of universal physics by Yang-Mills interactions, which we will generalise and describe by multiplication of linear novanion quantum propagators. In standard notation to be developed in chapters XV and XVII:

$$F_{ab} = \partial_a A_b - \partial_b A_a + A_a A_b - A_b A_a, \qquad (1)$$

Mathematically, the Yang-Mills interactions (1) are equivalent to the Levi-Civita connection in Riemannian geometry, which is the geometry of curved space-time:

$$R^d_{abc} = \partial_a \Gamma^d_{bc} - \partial_b \Gamma^d_{ac} + \Gamma^d_{ae}\Gamma^e_{bc} - \Gamma^d_{be}\Gamma^e_{ac}. \qquad (2)$$

Using equation (2) the gravitational interaction in general relativity, describing its energy

$$G_{mn} - ½g_{mn}G + g_{mn}\Lambda = 8\pi T_{mn} \qquad (3)$$

may be expressed by gauge contractions in the form of a projection, or dimensional reduction of the Yang-Mills interaction onto the four dimensional subspace called space-time. The four dimensional theory has ten separate gauges g_{mn} being the symmetrical components of the line element described in the restricted case of special relativity in chapter I

$$ds^2 = g_{mn}dx^m dx^n.$$

The contractions of equation (2) using the gauges results in a ten component theory (3), provided the connection is conformal, so that it naturally obeys conservation laws.

Thus the general relativistic structure is derived from the Yang-Mills structure. Conceptually, the restriction of the number of dimensions to four describes gravitation as a transformation of components possessed by particles and interactions living within this four dimensional world. Gravitation is a subset of universal physics.

4. Heim theory.

The fourth idea is the elementary structure of matter proposed by Burkhard Heim. It contains two subideas. The first expands general relativity space-time to six dimensions with partly imaginary components (a number is imaginary if its square is minus one). The second is the reduction of the theory to discrete theory, so space-time is built up from whole number bits.

Heim theory provides precise values for particle mass spectrums and the fine structure constant, which is a pure number obtained by squaring the charge on an electron and dividing by both Planck's constant of action and the speed of light. We will incorporate these ideas within the novanion model and relate them to Yang-Mills theory.

The mathematical idea of Hermitian and anti-Hermitian structures for the complex manifold in Heim theory will be related to novanion structures. It may be proved that the simplest novanions (after the complex numbers) are the quaternions and the octonions. After this there exist higher dimensional structures, the 10-novanions with one scalar part and 9 novanionic imaginary components, and for example the 26-novanions, with one scalar and 25 novanionic imaginary parts. All novanions have only one time component. It is a speculation of Daniel Hajas that these structures correspond to the 10-dimensional heterotic (fermionic) string and the 26-dimensional bosonic string discussed in the theoretical physics of string theory.

Heim theory is, like string theory, a discrete theory. Since its starting point is an enlargement of general relativity (which can be further extended to include the cosmological term – antigravity), the general relativistic differential equations are replaced by finite difference equations. To transform to a novanion structure we therefore consider, not a division algebra, but a novanion *ring* which does not everywhere have division. This continues to possess the time t = 0 nonconservation of number feature (this is *not* dependent on division), and the resulting theory can be of infinite extent, but the structure of the novanion ring is discrete at some lowest level. Thus we may relate the theory to questions met in quantum field theory of removing infinities, called renormalisability, for which string theory is designed to cope.

As mentioned by Heim, his theory may be embedded in a flat theory of 9 dimensions (which we relate to the 10-novanions) or a 25-dimensional theory (which we relate to 26-novanions).

It is clear, in mixing together the four ideas, that we can have a novanion universal physics incorporating features of the wavelet description of quantum space, the standard model of physics, Yang-Mills theory and the Heim determination of the fine-structure constant and the particle mass spectrums. The rest of this book is a working out of these interrelationships and their precise mapping to experimental data.

Natural philosophy.

There is a major difference in this work from the usual approach to a system of interpretation of physical events. John Bell has made a distinction between what is there (a *beable*) and what is observed (an *observable*). We also think, as in the models of quantum mechanics described by the de Broglie-Bohm interpretation of the Schrödinger equation, that there is an underlying reality, which following Kant we might call things-in-themselves. The viewpoint is sometimes described as a hidden variables theory. It does not conform to the assumptions of the von Neumann no-go theorem, that hidden variable theories in quantum mechanics do not exist, and the de Broglie-Bohm interpretation is a counterexample to this theorem, as has been discussed by John Bell [Be87].

We make a natural distinction between the absolute, which is what is there, and the relative, which is a change of absolute quantities. For the vacuum we thus describe it as absolute space, and its energy as absolute energy. For transfers we speak of relative space and relative energies.

We develop a mathematical model of this reality, and a mapping from the model to the observables in the theory. This mapping, as will be shown in practice, describes the world as measured by its observables in a different manner from the things-in-themselves. These observables are obtained in a natural way from the model. We treat the observer as being embedded in this model, and the processes she performs to measure objects and events in her world are also consequences of the model.

The justification of this approach is that the model is simple, and thus by the simplicity idea attributed to William Occam we are justified in promoting simple explanations as a true reflection of the physical world rather than complicated ones. The philosophy is dramatically revealed when time and space measurements are made together, when the mapping between the model and the observables is non-trivial.

Essential to novanion physics is the duality between the states of the model and the observer-based interpretation of the model. Observers exist not only as people- or things-in-themselves, but also as a result of the novanion universal model. Thus the existence of observers as physical objects implies that the variables they use are provided by the theory, but what the observer may interpret as a measurement may be expressed in the theory in a different way.

Manifesto for a new physics

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