

An Intensive Miniworkshop on  
**Going Beyond Metric: Black Holes, Non-Locality and Cognition**  
3–7 October 2010 / Tatranská Lomnica / Slovak Republic

The workshop will deal with various novel conceptual models/scenarios pertaining to the inner working of our universe. Participation in the event is by invitation only. Confirmed speakers include Rudolph E. Schild (Harvard University), Paul Bernstein (INREES Paris/Boston), Deborah Kala Perkins (UCLA), Petr Pracna (JH-Inst, AV ČR, Prague) and Luboš Neslušan (AsÚ SAV, T. Lomnica).

### Preliminary Programme

#### Sunday, October 3

10:00 – 12:00: Paul Bernstein, Humans Experiencing Non-locality?

Numerous laboratory experiments seem to demonstrate a human capacity to perceive physical objects and events occurring thousands of miles from the individual perceiver, and sometimes even occurring in the future. Also, spontaneous personal experiences, some of whose crucial details have later been physically verified, have included perception of events at great distances from the individuals physical body (even when in coma). Among hypotheses which have been offered to explain the accuracy of such perceptions are quantum non-locality, magnetic monopole currents, and gauge-symmetry shifts within electro-magnetic fields generated by the human neural system. This presentation will summarize the experimental and experiential data, and then will critically examine the various hypotheses.

14:15 – 16:45: Round-table on “Non-locality”

#### Monday, October 4

10:00 – 12:00: Rudolph E. Schild, How the Quantum Hologram Formulation in a Dyadic Universe Manifests the Modern Miracles

How would you create a universe out of nothing? You would make all attributes have their opposite attributes (for there to be up there must be down) and for there to be space there would be reciprocal space. To address such a conceptual challenge, one needs to find a proper mathematical formulation of the mathematics of reciprocal space that enables the quantum holograms underlying consciousness and telepathy.

This formulation looks much like the reciprocal space (“r-space”) of the William Tiller formulation, and I am seeking the formulation of the Einstein field equations in this reciprocal space. There would also be a reciprocal space representation of the Maxwell equations, with magnetic fields dominating.

Such a dyadic representation would answer a perplexing question; what is the attribute of mass that causes it to curve space-time? And what is the Cremona transformation between the two spaces? Because the conscious human being has a presence in both the Einstein 4-D space and through consciousness contributes to the dark energy field, humans are the quanta of the dark energy (zero point vacuum field).

14:15 – 16:45: Round-table on “Black Holes and Quantum Hologram”

## Tuesday, October 5

### 10:00 – 12:00: Kala Perkins, The Ontology of Cosmological Integrity Over Infinity

As we contemplate the entire field of universal causality, we begin to understand the organic fabric of infinity, across scales, fields, dimensions and creativity. Matter itself, we are finding to be more life-like, than life behaving in accordance with our pre-quantum materialist understanding. Infinity is like a zygote in cellular burgeoning emergence, arising through angular momentum and the nature of the void, in the surging flows generating gravitational and magnetic fields, the motion and spin of all spatial bodies across space-times, the evolution of singularities to universes, galaxy clusters, stars, planets and their satellites, the atmospheres, species and their migrations; from the emergences of bio-organisms, ecosystems, languages, cultures, civilizations, arts and all cross-correlations.

A new universal culture is championing the human race; never before has immersion in the cosmological environment been so clearly presented nor invited as revolutionary a sense of participatory identity to the human race. We are delving into the awareness of a complex relatedness with the expanse of spatial architectures and life that astrophysics, cosmology and astrobiology are revealing. History is marked by waves of interest and inquiry into the possibilities of the existence of other worlds; now our telescopic eyes are revealing these worlds, both within and universally. This affords a unique repertoire of dimensionalities in which to reconstrue our global cultural evolution and identity, as we redefine our collective global heritage, with infinity as our home.

The potential significance of space sciences to the human cognitive environment is yet to be fully ascertained. We understand that the entire history of the universe informs each and every particle and spin of the fabric of existence. The implications of this knowledge have the power to facilitate both social benefit and ideological transformation. We are discerning a new integrity between the human organism and consciousness, with the cosmological. As we apprehend cosmos as a self-aware autopoietic emergence, we awaken to our participation in the incalculable infinities through conscious awareness. Thus non-locality is transposed into omnipresence; time and the plethora of dimensions are re-cognized as the geometric permutations of the pervasive singularity. The omni-pervasiveness of this psycho-physical fabric that we call space-time, and our immersion in its totality, implies the imperative to ethics and integrity.

### 15:15 – 17:45: Round-table on “The Ontology of the Infinite”

## Wednesday, October 6

### 10:00 – 12:00: Luboš Neslušan, The unification of the fundamental interaction within Maxwell electromagnetism: Model of hydrogen atom, gravity as the secondary electric force, calculation of the unified inertia force

Considering two static, electrically charged, elementary particles, we demonstrate a possible way of proving that all known fundamental forces in the nature are the manifestations of the single, unique interaction. If there is only the single interaction, also the energy-impulse tensor in the general relativity must be the same for both gravitational and electromagnetic forces. Consequently, we suggest to replace the concept of potential (intensity of field) with the energy (acting force) and re-define the calibration of integration constants in the Schwarzschild solution of Einstein field equations. With these new constants, we sketch how the unique interaction can be described with the help of an appropriate solution of the well-known, common, classical Maxwell equations. According the solution, there are two zones, in the system of two oppositely charged particles, where the electric force is oscillating. The first particle can be in a stable,

constant distance from the second particle, between the neighbouring regions of repulsion and attraction. In an outer oscillation zone, the corresponding energy levels in the proton-electron systems are identical (on the level of accuracy of values calculated by the Dirac's equations) to some experimentally determined levels in the hydrogen atom. (The full set of energy levels can likely be obtained after the generalization of the universal metric towards the Kerr solution of Einstein field equations.) Another, inner oscillation zone will probably explain the quantization of atom nucleus, since its size is the same as the size of the nucleus. In addition, the magnitude of the corresponding potential energy rises several orders above the Coulombian behaviour in accord with the "strongness" of the strong force. For each system of two particles, there is also the zone with the macroscopic, i.e. monotonous behaviour of the force. As well, the solution can be used to demonstrate that the net force between two assemblies consisting each (or at least one) of the same numbers of both positively and negatively charged particles is never zero. On contrary, a secondary electric force, having the same orientation as the force between the oppositely charged particles, is always present. It can be identified to the gravity. Finally, the solution of the Maxwell equations can be used to calculate the inertia force of a particle. The term corresponding to the first-term electric inertia force is zero, therefore this force is not proportional to the first-term electric charge.

14:15 – 16:45: Round-table on "Beyond Metric"

Thursday, October 7

10:00 – 12:00: Petr Pracna, Are the Physical World and Its Space and Time Continuous?

The concept of motion and change in systems described by physical models, or more complex ones ranging from chemistry to biology, is based on the assumption of existence of basic building blocks which carry properties (e.g. mass, charge), by which they interact and consequently move in space. It is due to both the human perception experience and historical development of sciences that space and time, the two entities used for a quantitative description of motion and change, are considered as continuous and represented by real numbers. In such a framework of classical mechanics the 'position' in space and time is naturally defined and leads to the notion of a trajectory. Together with that, the general symmetries of space and time are related to the basic laws of conservation of energy, momentum, and angular momentum, the quantities appearing in the laws of motion. The concept of a deterministic evolution of systems of objects, described by exact positions in space and time, encounters difficulties when applied to the indivisible constituents of matter and/or their large collections. In both cases, the concept of a trajectory (single or many body ones) has to be abandoned in favor of a wave function or a distribution function which are subject to a different kind of equation of motion, the Schrödinger or Liouville equations. In both cases, the observable quantities, conserved or changing with time, are no longer functions of space coordinates but are expressed as expectation values of operators averaged over wave functions / distribution functions, which are subject to the laws of motion, i.e. the Schrödinger or Liouville equations. In both cases as well, the notions of space and time that lie in the background of the particular Hilbert and phase spaces, on which the wave functions / distribution functions are defined, can get only a seemingly slightly different but conceptually distinct meanings. In both cases, there also exist conceptual problems with the notion of a bond. In quantum mechanics even the simplest bond between two hydrogen atoms cannot be derived from the classical quantum theory leading to the description of an isolated hydrogen atom and requires an additional assumption of spin-1/2 carried by the electrons, a property that is only postulated. In the second case of statistical mechanics, if the existence of a bond between two objects is not a priori assumed and is considered by contrast to be a property emerging in an irreversible process, the celebrated 'arrow of time' requires the

time to be a special ‘star-Hermitian’ operator. It should be noted that any measurement of time requires an existence of a bound system with internal degree(s) of freedom corresponding to a periodic motion. Its periods then serve as units of time and the elapsed time is measured by counting the periods. From this point of view there always exists a lower bound for a unit of time corresponding to the finite dimensions of the system providing the unit of time. In this sense the continuous nature of space and time are becoming a moot point.

It is the aim of the current presentation in the framework of the workshop to put forward questions that may give clues to the shift of the basic paradigm from that of the physical space and time existing per se to that of both emerging together with the emergence of a bond. The crucial issue is whether one can build up the usual and useful picture of the 3D space and 1D time (with metric), the physical objects existing in, and the laws of motion that govern the evolution of systems in the sense of hierarchic build-up principle of complex systems, from a universal background in which space and time have no meaning and where the elementary ‘bond’ is represented by the entanglement of qubits. For this purpose the potential of the finite geometrical interpretations of matrix representations of systems of N-qubit operators will be discussed.

14:15 – 16:45: Round-table on “Hierarchy of Complex Systems”