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Invited talks

A Riviera Model and its Applications – From Rydberg Atoms to Building Codes

Tomislav Došlić

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Abstract

Riviera model is an analytically tractable simplification of a recently considered 2- dimensional model of urban settlement planning and development. In spite of its simplicity, it exhibits many interesting properties and has potential applications in several widely different realistic settings. In this talk, we review two such applications: modeling random sequential adsorption with blockade range and modeling urban development under conflicting interests.

Matrix Orderings and Graphs

Jing Huang

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Abstract

The problem of deciding whether a given 0,1-matrix have orderings that avoid containing a fixed submatrix (or a fixed family of such submatrices) is fundamental and has been much studied in the literature. For certain submatrices, the matrices with the desired ordering properties have important applications in linear programs, graph colouring, and location theory. Most of research is concerned with whether or not these problems have polynomial-time solutions, but they often have interesting interpretations for graphs.

In this talk, we will focus primarily on two submatrices, namely, the Γ matrix (which has rows $11, 10$) and the *Slash* matrix (which has rows $01, 10$). In addition to addressing computational solutions to the above mentioned problems for these submatrices we will exhibit the classes of graphs whose adjacency matrices having the corresponding ordering properties. These include interval graphs, chordal graphs, chordal bigraphs, strongly chordal graphs, cocomparability graphs, cocomparability bigraphs, and strong cocomparability graphs. All these classes of graphs admit beautiful characterizations by vertex orderings and forbidden structures as well as polynomial-time certifying recognition algorithms.

Time-fractional Partial Differential Equations on $\mathbb{R}^d$

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Joint work with Sandro Coriasco[1] and Giovani Girardi[2].

Abstract

We study regularity and decay properties for the solutions of the Cauchy problem for time-fractional partial differential equations, with tempered initial data, belonging to suitable distribution spaces, associated with a differential operator on space variables with polynomially bounded coefficients.

Equation under consideration is of the form

$$\begin{aligned}
&\partial_t^r u(t,x) + Op(a)u(t,x) = f(t,x),\\
&(t,x) \in (0,+\infty) \times \mathbb{R}^d,\\
&u(0,x) = u_0,\ x \in \mathbb{R}^d.
\end{aligned}$$

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$Op(a)$ is a Fourier multiplier of the form $a(D)$, where the symbol $a(xi)$ is a non-negative continuous function of slow growth or an SG or Hörmander type pseudo-differential operator with symbol $a(x,\xi)$ with usual properties. We obtain a representation formula for the solution, modulo time-continuous functions, smooth and rapidly decreasing with respect to the space variables.

Recursive Identity Functions in Computation Theory

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Abstract

This talk examines the role of recursive identity functions in the foundations of computation theory, focusing on their mathematical properties and practical applications in computational models. We begin by rigorously defining recursive identity functions, exploring their significance in lambda calculus and Turing machines, where they serve as fundamental components of computational universality. Building on these principles, we discuss the interaction between recursive functions and quantum gates, demonstrating how gates such as Hadamard, CNOT, and Toffoli facilitate complex computation through recursive processes. We focus on the established connections between recursion, entanglement, superposition, and information processing, emphasizing how these concepts underpin classical and quantum computational models. Throughout, the talk relates to well-supported theories from computer and quantum information science; however, it also aims at stimulating new ideas for exploration in the cross-section betweeen computing, quantum mechanics, and mathematics.

Contributed talks

Electrochemical Growth of Graphene and Carbon Nanotubes in Molten Salts: Structural Insights and Data-Guided Optimization

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Joint work with Aleksandar T. Dimitrov, and Viktor Andonovikj.

Abstract

Electrochemical synthesis in molten salts has emerged as a scalable, cost-effective, and environmentally sustainable approach for producing carbon nanomaterials such as graphene and multi-walled carbon nanotubes (MWCNTs). This study presents recent advances in controlling synthesis parameters and characterizing the resulting structures to support rational nanomaterial design. MWCNTs were synthesized using both stationary and pulsed current regimes in molten salt electrolytes. Process variables such as voltage, current density, temperature, and electrode configuration significantly influenced the morphological and crystallographic features of the nanotubes.

Structural parameters, including inner and outer diameters, wall number, and chirality indices, were determined through Raman spectroscopy and computational modeling using Python tools. Graphene was obtained via electrolysis as a cleaner alternative to conventional synthesis methods. X-ray diffraction (XRD) analysis was used to estimate the number of layers and their distribution, employing both the Scherrer equation and an advanced Laue-function-based model. The latter demonstrated improved accuracy in resolving asymmetric (002) peaks and enabled precise quantification of multi-layer configurations through symmetry-informed interval optimization. Finally, interpretable machine learning techniques, particularly decision tree models, were applied to identify key synthesis parameters that influence material quality. Models trained on experimental datasets allowed the derivation of predictive rules, contributing to improved process control and material performance. This integration of electrochemical synthesis, structural characterization, and AI-driven analysis offers a promising direction for sustainable nanomaterial engineering.

Diameter of Nanotori

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Joint work with Pavel Dimovski, Martin Knor and Riste Škrekovski.

Abstract

A cubic graph which has only hexagonal faces, and can be embedded into a torus is known as generalized honeycomb torus or honeycomb toroidal graph, abbreviated as nanotorus. This graph is determined by three parameters a, b, and c, and denoted by $G_{a,b,c}$. Recently, B. Alpspach dedicated a survey paper to nanotori, wherein a number of open problems are suggested. In this article, we deal with one of the problems given in the survey, i.e., we determine the diameter of nanotorus $G_{a,b,c}$ as a function of the parameters a, b, and c. We obtain that the diameter of $G_{a,b,c}$ for $b \leq a$ is just a. For the case $a < b$, we distinguish two subcases: $a \leq c < b$ and $c < a < b$. In both subcases we determine the diameter for b big enough.

Graph-Directed Fractals: Dimensions and Measures

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Abstract

In this talk, we explore the geometric and measure-theoretic properties of fractal sets defined by symbolic dynamics constrained by directed graphs. Given a finite set of conformal contractions and a $\{0,1\}$-valued adjacency matrix M, we define graph-directed self-conformal sets as projections of infinite M-admissible sequences. These constructions generalize classical iterated function systems by allowing the structure of admissible compositions to be governed by the connectivity of a directed graph.

We demonstrate that when M is irreducible, the associated attractors F_i are quasi self-similar, share the same Hausdorff dimension, and their s-dimensional Hausdorff measures are uniformly comparable. Furthermore, we show that key geometric tools—including semiconformal structure lemmas and measure comparison theorems—extend naturally to this graph-directed setting. These results also apply to *sub self-conformal sets*, which generalize attractors by relaxing strict self-containment.

Abelian and Tauberian Type Results for the Fractional Hankel Transform

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Abstract

In this talk, we present an Abelian theorem for the fractional Hankel transform (FrHT) on the Montel space $\mathcal{K}_{-1/2}(\mathbb{R}_+)$, which is designed to overcome the limitations of the Zemanian space $\mathcal{K}^{\mu}(\mathbb{R}_+)$. The essential part will be a new construction of the basic space $\mathcal{K}_{-1/2}(\mathbb{R}_+)$, ensuring Montel space properties that guarantee desirable topological features such as the equivalence of weak and strong convergence. The talk concludes with a Tauberian theorem that provides the converse implication—showing that, under appropriate growth and limit conditions, the asymptotic behavior of the original distribution can be deduced from that of its FrHT.

The Hamming Spectrum and Energy of Graphs: Bounds, Factorizations, and Equitable Partitions

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Abstract

The Hamming matrix $H(G)$ of a simple graph G encodes the Hamming distances between the binary incidence strings of its vertices, giving rise to the Hamming spectrum and the associated Hamming energy $HE(G)$.

First, tight bounds on the largest and smallest eigenvalues of $H(P_n)$ for path graphs P_n are established, and closed-form formulas for the full Hamming spectrum and energy of regular graphs (including cycles), their complements, and their line graphs are derived. A novel factorization relating the characteristic polynomial of $H(G)$ to those of $H(\overline{G})$ and $H(L(G))$ is also proved.

A unified framework based on equitable partitions is developed to compute the Hamming spectrum and energy for a wide range of graph families, such as semi-regular bipartite graphs, complete multipartite graphs, wheel and windmill graphs, and coronas of K_3 and mK_1, by reducing each to a quotient matrix of dimension at most 4×4. These results substantially enlarge the catalog of graphs with known Hamming-based spectral invariants and demonstrate the power of equitable partitions in spectral graph theory, with potential applications in chemical and combinatorial contexts.

Distance sequences to bound distance-based topological indices

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Abstract

Let G be a connected graph. The distance sequence of G is the nondecreasing sequence of the distances between all unordered pairs of vertices of G.

In this talk we discuss properties of the distance sequence. Making use of these properties, we obtain sharp bounds on various distance-based topological indices from various graph classes. Among others, we obtain a sharp lower bound on the Harary index, defined as $\sum_{\{u,v\}\subseteq V} \frac{1}{d(u,v)}$, and a sharp upper bound on the Hyper Wiener index, defined as $\sum_{\{u,v\}\subseteq V} \frac{1}{2}\big(d(u,v)^2 + d(uv)\big)$, for graphs of given order and size. The former result solves a problem posed by Xu, Das and Trinajstić in their monograph [The Harary index of a graph, Springer (2015)].

We also obtain sharp upper bounds on distance-based topological indices for other graph classes, among those maximal outerplanar graphs, k-trees, and k-connected graphs, as well as the strong product of graphs.

On a Class of Mikhlin Multipliers Which Do Not Preserve L^1-, L^∞-Regularity and Continuity

Pavel Dimovski

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Abstract

We show that every Fourier multiplier with real-valued and positively homogeneous symbol of order 0, supported in a cone whose dual cone has a nonempty interior and such that the average of the positive part is sufficiently larger than the average of the negative part does not preserve the L^1- nor the L^∞-regularity and neither the continuity. We also construct wave front sets which measure the microlocal regularity with respect to a large class of Banach spaces. As a consequence of the first part, we argue that one can never construct wave front sets that behave in a natural way and measure the microlocal L^1- nor L^∞-regularity and neither the continuity.

Geometric Approach for Topological Indices

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Abstract

Considering the pair of the end-vertex degrees of an edge in a graph as a point in a coordinate system, one can obtain various interesting degree-based topological indices. The first in this series was the Sombor index [1]. This index was an impetus for introducing a number of its descendants (see [2, 3, 4, 5] and references cited therein). Here, an overview of these indices and their properties will be briefly outlined.

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The Role of ChatGPT in Supporting Mathematical Reasoning for Electronics Problems

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Joint work with Giorgia Nieddu1, Bojan Glushica, and Maria Cristina Carrisi.

Abstract

This talk explores the role of ChatGPT in supporting undergraduate students' mathematical reasoning when solving electronics problems. We analyzed the model's responsiveness, problem-solving strategies, and limitations using Brousseau's Theory of Didactical Situations. Although ChatGPT proveded helpful suggestions, significant inconsistencies in its outputs undermined students' trust. The findings highlight ChatGPT's dual potential as both a facilitator and a challenge in educational contexts, suggesting that its integration into learning activities must be carefully designed to enhance critical thinking and validation processes.

Fixed Point Theorem for a Class of Chatterjea-Type Mappings

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Abstract

In this paper, a new class of mappings in a complete metric space is introduced, which is in a certain sense analogous to Chatterjea-type mappings, just as the class of Koparde–Waghmode mappings is analogous to Kannan-type mappings. Furthermore, a fixed point theorem and a common fixed point theorem are proved regarding this class of mappings.

C-Chain Connected Set in a Topological Space

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Abstract

In this talk, we define C-chain connected set in a topological space. Let X be a topological space and let $C \subseteq X$. Let $\mathcal{V}$ be an open covering of X and $x, y \in X$. A chain in $\mathcal{V}$ that connects x and y is a finite sequence of elements of $\mathcal{V}$ such that x belongs to the first element of the sequence, y to the last, and the intersection of any two consecutive elements of the sequence is nonempty. The set C is C-chain connected in X, if for every clopen (closed and open) covering $\mathcal{U}$ of X and every $x, y \in C$, there exists a chain in $\mathcal{U}$ that connects x and y. Moreover, we will define more kinds of sets using the notion of chain and clopen covering and we will state and prove the properties of those sets.

Assessing Pigmented Skin Moles Using Minkowski Fractal Dimensions and Comprehensive Color Channel Analysis

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Abstract

Joint work with Mia Darkovska, Jasmina Angelevska Kostadinoska, Ana Ristevska Dimitrova, and Vesna Andova.

Distinguishing between benign and malignant moles is crucial for early detection and treatment of skin cancer, as malignant moles can develop into life-threatening conditions if not identified promptly. Doctors often use the ABCDE criteria (Asymmetry, Border, Color, Diameter, and Evolution) to assess and differentiate these moles. In the analysis of skin tumors, the C criterion (color) plays a critical role in distinguishing between benign and malignant moles. This study examines the effectiveness of various color spaces, such as HSV, XYZ, YCbCr, and Lab, in the differentiation process. Our research indicates a statistically significant difference in the channel features

of these color spaces when comparing benign to malignant skin moles. By evaluating these differences, we demonstrate that color can serve as a reliable factor in identifying the two types of moles. Additionally, we will briefly discuss the B criterion (border irregularity) to provide a broader perspective on mole classification.

Random Forest for Detecting Thoracic Pathologies in Chest Radiographs

Sijche Pechkova

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Abstract

Finding lung diseases in chest X-rays is hard because signs can be subtle. Also in many cases different doctors might disagree. We developed a simpler method using Support Vector Machines (SVM) with special math functions (Legendre or Chebyshev polynomials). These functions help the computer: spot patterns in the X-ray better, focus on small problem areas, and find key differences between healthy and sick patients. Our method uses far less computer power than complex deep learning systems. It should be just as accurate, work well even when some diseases are rare, and be easier to understand why it makes a decision. This work offers a practical tool for doctors to quickly and accurately diagnose lung problems. It shows a simpler, math-based alternative to black box deep learning that could be used in hospitals.

Support Vector Machines Classifiers for Detecting Thoracic Pathologies in Chest Radiographs

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Abstract

Finding lung diseases in chest X-rays is hard because signs can be subtle. Also in many cases different doctors might disagree. We developed a simpler method using Support Vector Machines (SVM) with special math functions (Legendre or Chebyshev polynomials). These functions help the computer: spot patterns in the X-ray better, focus on small problem areas, and find key differences between healthy and sick patients. Our method uses far less computer power than complex deep learning systems. It should be just as accurate, work well even when some diseases are rare, and be easier to understand why it makes a decision. This work offers a practical tool for doctors to quickly and accurately diagnose lung problems. It shows a simpler, math-based alternative to black box deep learning that could be used in hospitals.

Spaces of Distributions Having Sobolev Wave Front in a Fixed Conic Set

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Join work with Stevan Pilipović.

Abstract

Let O be an open set in $\mathbb{R}^n$ and u a distribution on O. The Sobolev wave front set $WF^r(u)$ of order $r \in \mathbb{R}$ of u is defined as follows: The point $(x, \xi) \in U \times (\mathbb{R}^n \backslash \{0\})$ does not belong $WF^r(u)$ if there are an open cone $V \subseteq \mathbb{R}^n$ containing ξ and $\varphi \in \mathcal{D}(U)$ satisfying $\varphi(x) \neq 0$ such that $\|\langle\cdot\rangle^r \mathcal{F}(\varphi u)\|_{L^2(V)} < \infty$; $WF^r(u)$ is a closed conic subset of $U \times (\mathbb{R}^n \backslash \{0\})$. Given a fixed closed conic subset L of $O \times (\mathbb{R}^n \backslash \{0\})$, the space of distributions having Sobolev wave front set of order r in L is defined by: $\mathcal{D}'^r_L(O) := \{u \in \mathcal{D}'(O) \,|\, WF^r(u) \subseteq L\}$. In this talk, we are going to introduce locally convex topology on $\mathcal{D}'^r_L(O)$ which will make the pullback by a smooth map $f : O \to U$ of smooth functions, defined as $f^* : \mathcal{C}^\infty(U) \to \mathcal{C}^\infty(O)$, $f^*u := u \circ f$, to continuously extend to a map $f^* : \mathcal{D}'^{r_2}_{f^*L}(U) \to \mathcal{D}'^{r_1}_L(O)$ for appropriate r_1 and r_2 when L is in a favourable position with respect to f. Similarly, we define a locally convex topology on $\mathcal{D}'^r_L(M)$ when M is a smooth manifold and we show an analogous result about the pullback in the case of manifolds as well.

Graph-Theoretic Algorithms for Code Equivalence

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Abstract

Code equivalence over various metrics has attracted a lot of interest in recent years as a hardness assumption for designing Fiat-Shamir signatures. As a result, our understanding of its practical hardness has significantly improved in the last few years. In this talk, I will give an overview of these recent algorithmic advancements. Interestingly, the best current algorithms are graph-based.

Digital Twin and Machine Learning as Tools for Measurement and Diagnostic Methods in Industry 4.0

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Abstract

In this talk, we present the project "Digital Twin and Machine Learning as Tools for Measurement and Diagnostic Methods in Industry 4.0", which is currently in its preparatory phase. The project focuses on the design and development of digital models and intelligent algorithms that will later be implemented in industrial measurement systems. Its central goal is to build an integrated framework that combines sensor data acquisition, digital twin modeling, and machine learning techniques to enhance the precision, adaptability, and intelligence of modern diagnostic processes.

At this stage, the work is primarily devoted to developing simulation models, designing algorithms, and selecting appropriate hardware and software components for future integration. The research team is establishing the methodological foundation for real-time monitoring, anomaly detection, and predictive maintenance, ensuring that the developed tools can be efficiently transferred to industrial environments once implementation begins.

In the upcoming phase, the project will advance toward experimental validation and system integration, testing the digital twin and ML modules on selected industrial case studies. These activities will enable the evaluation of system performance, efficiency, and scalability, and will serve as a basis for developing a prototype platform for intelligent measurement and diagnostics.

The expected outcomes include not only technological advancements in measurement and automation but also a strong educational and research impact through the creation of demonstrative materials, laboratory setups, and digital resources for students and professionals. By combining digital twin technology and machine learning, the project paves the way for the next generation of self-adaptive, data-driven measurement systems aligned with the objectives of Industry 4.0 and the emerging Industry 5.0 vision.

Graph Pattern-Based Query Rewriting for Fine-Grained Access Control in SPARQL

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Abstract

Fine-grained access control is essential for secure querying over knowledge graphs, where sensitive and interlinked data is accessed using SPARQL. Despite its expressiveness, SPARQL lacks built-in mechanisms for authorization, making it difficult to enforce access policies in open and federated settings. To address this, we present a formal model for policy-based query rewriting that ensures only authorized data is returned in response to a query. We model RDF data as sets of $quads(g, s, p, o)$, and SPARQL queries as quad blocks, which contains sets of quad patterns evaluated conjunctively. An authorization policy is defined as a triple $P = (\Pi, perm, \rho)$, where Π is a block of quad patterns specifying protected content, $perm \in \{ALLOW, DENY\}$ is the permission type, and ρ is a priority used for resolving conflicts. The core of the rewriting process is a graph pattern intersection problem: for each query block Q, we compute the intersection between the query's graph pattern and the set of patterns permitted (or denied) by applicable policies. This requires computing a variable mapping μ between variables in the policy patterns and terms in the query. The mapping is valid if it satisfies: (1) Structural compatibility - each pattern in the policy block matches a pattern

in the query under μ, and (2) Type compatibility - variables are mapped consistently with respect to RDF term types (URIs, literals, or blank nodes). The mapping function is implemented as a SPARQL FILTER expression that enforces equality constraints between the variables in the policy pattern and those in the query. These filters are logically combined using disjunction to represent the union of matching cases. If a policy is active, for ALLOW, the mapped policy pattern $\mu(\Pi)$ is added conjunctively: $Q \leftarrow Q \cup \mu(\Pi)$. For DENY, it is subtracted using SPARQL's MINUS operator: $Q \leftarrow Q \setminus \mu(\Pi)$. The result is a rewritten query that returns only those bindings that satisfy both the original pattern and the active policy constraints. This method preserves the declarative semantics of SPARQL while enabling secure, policy-compliant querying over RDF data, and provides a principled framework for semantic access control based on graph pattern reasoning.

The Conflict-free Coloring and its Variations

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Abstract

A proper vertex coloring φ of a graph G is said to be conflict-free (resp. odd) if, for each non-isolated vertex $x \in V(G)$, there exists a color c such that $\varphi^{-1}(c) \cap N(x)$ has size one (resp. an odd size). In other words, in the neighborhood of every non-isolated vertex, some color appears exactly once (resp. an odd number of times).

In this talk, I will present first some earlier results on odd and conflict-free colorings obtained as a joint work with M. Petruševski and Y. Caro, as well as more recent results concerning the degree-choosability of conflict-free colorings obtained as a joint work with R. Xu and M. Kashima.

Data-Driven Optimization of Cop Diameter in Ring Spinning Using the Taguchi Design Approach

Emilija Toshikj

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Joint work with Sijche Pechkova.

Abstract

The ring-spinning process is an important manufacturing process for the mass customization of clothing goods, especially for large-run yarns. Cop quality is one of the most important characteristics concerning ring-spun yarns. It is mainly evaluated and compared via the diameter Bof a cop. This study aimed to optimize the ring spinning parameters influencing the cop diameter. The optimization of the spinning process was investigated using the Taguchi method. The diameter of the cop in the ring-spinning process was characterized and evaluated at the variation in spindle speed, traveler mass, and cop height. It was concluded that changing the doff stage over the cop had a severe effect on the diameter of the cop which gave a recommendation for engineering design too but the cop optimum diameter for the manufacturers and researchers. Traveler mass and spinning spindle had no effect. The optimization method of Taguchi gave a reasonable result to the maximum cop diameter corresponding to the specimen and test condition. According to the proposed levels of the control factors it was concluded that the maximum cop dimeter at the bottom ring rail position could be achieved at the factor level K1L1M2. Using the S/N ratio, the best combination

of factor levels that yield the highest value of cop diameter was detected efficiently.

The Universe as a Harmonic Oscillator Between Dense Matter and Dense Energy

Kostadin Trenchevski

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Joint work with Ilija Jovceski and Emilija Celakoska.

Abstract

A geometrical model of the universe which is the intersection of two 4D spheres, whose radii change by $\cos(w\tau)$ and $\sin(w\tau)$. The time flow is admitted when the universe belongs to both spheres as harmonic oscillators. However, the critical mass density of the universe is limited, and it helps the universe to avoid these periodic singularities. When this critical mass density is achieved, it remains unchangedfor one time interval until it is again intersection of the mentioned two 4D spheres. During that interval, there is no flow of time and this epoch can be called "frozen epoch". Dual to the space part of the universe, there is also 3D temporal part, which enables motion in each direction. Symmetrically, there also exist two "Big Bang" singularities in this temporal part. The critical energy density is also limited

and it helps the universe to avoid the "temporal Big Bang" singularities and then analogous "frozen epochs" also appear. As a consequence the universe periodically moves from spatial to temporal frozen epoch and back. At the present time the universe moves toward the temporal frozen epoch and its position by calculation of the angle $w\tau$ is determined. The scalar curvature is calculated and the Cosmic Microwave Background radiation is explained. This model can be supported by the recent observations with the JWS Telescope, since it provides observation of many large galaxies close to the last Big Beng singularity.

Functional Approximations: A Metrical Perspective

Daniel Velinov

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Abstract

In this talk, the metrical approximations of functions $F : \Lambda \times X \to X$ by trigonometric polynomials and ρ-periodic type functions, where $\emptyset \neq \Lambda \subseteq \mathbb{R}^n$, X and Y are complex Banach spaces, and ρ is a general binary relation on Y are analyzed. We establish a range of structural properties of the newly introduced function spaces and explore their approximation behavior. Furthermore, we demonstrate the applicability of our theoretical framework to various classes of equations, including abstract Volterra integro-differential equations and partial differential equations.

QUBOs, Quantum Annealing and Biqbin

Beno Zupanc

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Abstract

This talk explores the role of Quadratic Unconstrained Binary Optimization (QUBO) as a unifying framework for modeling a wide variety of hard combinatorial problems, its usefulness in quantum computing and how we leveraged it with our BiqBin Max-Cut solver.

QUBO formulation is equivalent to the Ising model, a structure that makes it particularly well-suited for quantum annealers such as those developed by D-Wave. This connection allows for the translation of real-world optimization tasks into forms that can be tackled not only by classical heuristics but also by emerging quantum hardware.

We compare classical simulated annealing and quantum annealing, both inspired by physical annealing processes but operating under fundamentally different mechanisms, one probabilistic and thermal, the other quantum-mechanical and based on tunneling.

We will introduce the Max-Cut problem in general, with relation to the BiqBin solver, a modern parallel branch-and-bound solver for linearly constrained binary quadratic problems.

As part of the QBIQ research project, we will explain how we expanded BiqBin into a classical-quantum hybrid solver which now supports any custom heuristic function, including transforming the branch-and-bound Max-Cut subproblem into a QUBO and solving that on existing quantum hardware.

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