BLAST 2024 Abstracts

Invited Talks and Tutorials

Speaker: Logan Crone, University of North Texas
Title: *A modification of McMullen's game and the perfect set property*
Abstract: In this talk, we introduce a modification of McMullen's absolute winning game and prove that this game is equivalent to the perfect set game. We will show that this game-equivalence has implications for the geometry of perfect sets in Euclidean space.

Speaker: Monroe Eskew, University of Vienna
Title: *An $\aleph_1$-dense ideal on $\aleph_3$*
Abstract: Answering a question of Foreman, we show from a huge cardinal that it is consistent to have a countably complete, uniform, $\aleph_1$-dense ideal on $\aleph_3$. The main innovation is a new forcing for getting κ-dense normal ideals on successor κ, enabling such ideals to exist on $\aleph_1$ and $\aleph_2$ simultaneously. The model also provides answers to few combinatorial questions of Todorcevic and others. This is joint work with Yair Hayut.

Speaker: Ralph Freese, University of Hawaii
Title: *Lattices and Algebras*
Abstract: This talk will consider these two corners of the BLAST pentagon. It will meander through various results, some old and some new. It should be accessible to everyone in the BLAST audience.

Speaker: Gabriel Goldberg, UC Berkeley
Title: *The Ultrapower Axiom in nature*
Abstract: We introduce the Ultrapower Axiom (UA), a combinatorial principle abstracted from the theory of fine structural inner models for large cardinal axioms. We then explore three unexpected contexts in which this principle arises in nature, apparently divorced from the fine structure theory that originally motivated it, with applications to Reinhardt cardinals, the Axiom of Determinacy, and inner models constructed from extended logics. Finally, we speculate about the implications of these occurrences of UA for the future of inner model theory.

Speaker: Jan Grebík, UCLA
Title: *Edge colorings in measurable combinatorics and distributed computing*
Abstract: One of fundamental notions of graph theory is the chromatic index $\chi'(G)$ of a graph G which is the smallest number of colors needed to color all edges of G so that every two edges that intersect have different colors. The famous upper bound of Vizing states that $\Delta+1$ colors is enough, where Δ is the maximum degree of G. In fact, there is a polynomial time sequential algorithm that produces such a coloring. In this talk I will discuss edge colorings from the perspectives of descriptive set theory and the LOCAL model of distributed computing.

Speaker: Chris Lambie-Hanson, Czech Academy of Sciences
Title: *Generalized almost disjoint families and injective Banach spaces*
Abstract: We generalize the notion of almost disjoint family to the setting of arbitrary totally disconnected Hausdorff spaces. We present some results about the existence of such families on the Čech-Stone remainder of the integers. As an application, we present some modest progress concerning the open question of the injective dimension of the Banach space c_0. This is joint work with David Schrittesser.

Tutorial Speaker: Andrew Marks, UC Berkeley
Title: *Asymptotic dimension, hyperfiniteness, and Borel graph combinatorics*
Abstract: We survey notions of asymptotic dimension for studying Borel equivalence relations, graphs, and metric spaces. These ideas are an adaptation of Gromov's notion of asymptotic dimension to the Borel setting. These concepts of Borel asymptotic dimension are useful for proving hyperfiniteness of actions of certain amenable groups, studying tilings, and proving combinatorial theorems about Borel graphs. This is joint work with Conley, Jackson, Seward, and Tucker-Drob.

Speaker: Michael Mislove, Tulane University
Title: *Commutative monads, central monads and probabilistic models*
Abstract: Domain theory seeks to provide semantic models for high-level programming languages. An important outstanding problem concerns how to incorporate valuations (the domain-theoretic analog of probability measures) in such models. In this talk, I'll explain why the general question remains unresolved, and I'll also describe recent work that identifies subfamilies of valuations that serve as appropriate models. The abstract setting involves commutative monads and central monads, the latter being a notion that emerged in devising the results. This talk relies on joint work with Xiaodong Jia (Hunan), Andre Kornell (Dalhousie), Bert Lindenhovius (Johannes Kepler Universitaet) and Vladimir Zamdzhiev (Inria, Paris Saclay).

Speaker: Diana Montoya, TU Wien
Title: *Pseudo Intersections and towers for uncountable cardinals*
Abstract: In this talk, I will focus on the study of pseudo intersections and towers in the case of uncountable cardinals. In particular, I will focus on the pseudo-intersection and tower numbers, first in the case of regular cardinals (a joint work with Fischer, Schillhan and Soukup) and afterward in the case of singular cardinals and some recent results on the existence of these objects for this particular case, the latter is in part a joint work with Raul Figueroa.

Speaker: Justin Moore, Cornell University
Title: *Large minimal non-σ-scattered linear orders*
Abstract: A linear order is scattered if it does not contain a copy of the rational line and σ-scattered if it can be decomposed into countably many scattered linear orders. Laver has shown that the class of σ-scattered linear orders is well quasi-ordered and hence well understood. It is therefore natural to study linear orders which are minimal with respect to being non-σ-scattered—those which embed into all of their non-σ-scattered suborders. We give the first consistent construction of a minimal non-σ-scattered linear orders of cardinality greater than $\aleph_1$ and also show that $\diamondsuit$ implies that there is a minimal non-σ-scattered linear order which is a Countryman line. This is joint work with Todd Eisworth and James Cummings.

Speaker: Dmitri Pavlov, Texas Tech University
Title: *Measurable locales, commutative von Neumann algebras, and measure theory*
Abstract: We show that the following five categories are equivalent: (1) the opposite category of commutative von Neumann algebras; (2) compact strictly localizable enhanced measurable spaces; (3) measurable locales; (4) hyperstonean locales; (5) hyperstonean spaces. This result can be seen as a measure-theoretic counterpart of the Gelfand duality between commutative unital C*-algebras and compact Hausdorff topological spaces. If time permits, I will discuss future directions and applications such as a measurable variant of the Serre-Swan theorem, closed category structure on measurable locales, and a categorical framework for the disintegration theorem and pushforward/pullback of measures

Speaker: Ralf Schindler, University of Münster
Title: *Martin's Maximum with an asterisk, revisited*
Abstract: The asterisk version MM^* of MM results from MM by relaxing "can be forced by a stationary set preserving forcing" to "is honestly consistent." This is in the spirit of Ω-logic. We show that its restricted version $MM^*_{\omega_2}$ holds in a P_{max} extension of a strong model of determinacy. It is open how to force this statement over a ZFC model with large cardinals. This is joint work with my student Taichi Yasuda.

Speaker: David Simmons, York University
Title: *Determinacy and indeterminacy of games played on complete metric spaces*
Abstract: Schmidt's game is a powerful tool for studying properties of certain sets which arise in Diophantine approximation theory, number theory, and dynamics. Recently, many new results have been proven using this game. In this talk we address determinacy and indeterminacy questions regarding Schmidt's game and its variations, as well as more general games played on complete metric spaces (e.g. fractals). We show that except for certain exceptional cases, these games are undetermined on Bernstein sets.

Speaker: Dima Sinapova, Rutgers University
Title: *The tree property and stationary reflection*
Abstract: We show that from large cardinals, it is consistent to have stationary reflection at $\aleph_{\omega+1}$ together with the tree property, and actually the ITP, at $\aleph_{\omega+2}$. Our construction uses a Mitchell-like version of diagonal extender based forcing. Then we do a Prikry type iteration to also obtain stationary reflection. Since the tree property at the double successor of a singular strong limit cardinal implies that SCH fails, this is a strengthening of getting the failure of SCH at $\aleph_\omega$ together with stationary reflection at $\aleph_{\omega+1}$. Our result fits into the broader context of obtaining compactness type principles together with instances of incompactness. This is joint work with Alejandro Poveda.

Speaker: Slawomir Solecki, Cornell University
Title: *Topological groups without unitary representations, submeasures, and the escape property*
Abstract: We give new examples of topological groups that do not have non-trivial continuous unitary representations, the so-called exotic groups. We prove that all groups of the form $L^0(\phi, G)$, where ϕ is a pathological submeasure and G is a topological group, are exotic. This result extends, with a different proof, a theorem of Herer and Christensen on exoticness of $L^0(\phi, \mathbb{R})$ for ϕ pathological. In our arguments, we introduce the escape property, a geometric condition on a topological

group, inspired by the solution to Hilbert's fifth problem and satisfied by all locally compact groups, all non-archimedean groups, and all Banach–Lie groups. Our key result involving the escape property asserts triviality of all continuous homomorphisms from $L^0(\phi, G)$ to $L^0(\mu, H)$, where ϕ is pathological, μ is a measure, G is a topological group, and H is a topological group with the escape property. This is joint work with F. Martin Schneider.

Speaker: Sarka Stejskalova, Charles University
Title: *Forcing over a free Suslin tree*
Abstract: We will start by reviewing three open questions, due to Jin and Shelah, Moore, and Bilaniuk, related to the existence of certain ω_1-trees under the assumption that there are no ω_1-Kurepa trees. In the second part we will briefly describe a new idea based on forcing over a free Suslin tree which leads to the solution of these questions. This is a joint work with John Krueger.

Tutorial Speaker: Agnes Szendrei, University of Colorado Boulder
Title: *General Finite Basis Theorems in Algebra*
Abstract: In 1951, Roger Lyndon proved that every 2-element algebra is finitely based (i.e., has a finitely axiomatizable equational theory). In 1954, he exhibited the first example of a nonfinitely based finite algebra. In the early 1960's, Alfred Tarski asked whether there is an algorithm which, given an arbitrary finite algebra as input, decides if the algebra is finitely based. In 1996, Ralph McKenzie proved that such an algorithm does not exist. On the other hand, it has turned out that there are broad classes of algebras which are 'structured enough' so that all finite algebras in those classes are finitely based. I will trace the developments of these general finite basis theorems from the late 1970's until today.

Speaker: Joanne Walters-Wayland, Chapman University
Title: *Semilattice base hierarchy for frames and its topological ramifications*
Abstract: We develop a hierarchy of semilattice bases (S-bases) for frames. Consider a (unbounded) meet-semilattice A, all frames with the A as an S-base form an interval in the coframe of sublocales of the frame of downsets of A. We give an explicit description of the nuclei associated with these sublocales. We study various degrees of completeness of A, which generalize the concepts of extremally disconnected and basically disconnected frames. We also introduce the concepts of D-bases and L-bases, as well as their bounded counterparts, and show how our results specialize and sharpen in these cases. Classic examples that are covered by our approach include zero-dimensional, completely regular, and coherent frames, allowing us to provide a new perspective on these well-studied classes of frames, as well as their spatial counterparts. In this talk, we will focus on the cozero elements (of a completely regular frame) considered as an S-base (in fact an L^*-base).

Contributed Talks

Speaker: Kempton Albee, University of Denver
Title: *A recipe for canonical formulas in residuated lattices*
Abstract: Classically speaking, canonical formulas have been powerful tools in studying intuitionistic and modal logics. In this talk, we continue the exportation of canonical formulas to the algebraic setting and capture sufficient ingredients for producing them in some axiomatic extensions of the Full Lambek calculus. We will begin by introducing some preliminaries on residuated lattices and give the needed ingredients to prove canonical formulas for a variety of residuated lattices - these entail a strengthened finite embeddability property, existence of opremums in subdirectly irreducibles, and the associated logic having a special deduction theorem. We then apply these formulas to a series of well-known varieties and show there are uncountably many stable extensions supporting the finite model property, in some cases.

Speaker: Natasha Dobrinen, University of Notre Dame
Title: *Coloring pseudotrees*
Abstract: This is joint work with David Chodounský, Monroe Eskew, and Thilo Weinert. We obtain upper bounds for the big Ramsey degrees for chains of size 2 and more. Previous work proved indivisibility and showed that antichains of size two in the pseudotree do not have finite big Ramsey degrees. We develop topological Ramsey spaces for copies of a fixed pseudotree, providing infinite-dimensional Ramsey theorems. These Ramsey spaces are used to prove upper bounds for chains, while providing additional clarity for the case of antichains. While the members of the Ramsey space are coding trees with infinitely many unary relations, the proof of the pigeonhole uses no forcing argument, but only induction arguments with $\omega + 1$ many judiciously chosen applications of Halpern-Läuchli. Our work is motivated by work of Kwiatkowska who proved Ramsey expansions for Fraïssé-HP classes of trees and used them to compute the universal minimal flows of Ważewski dendrites.

Speaker: Matt Evans, Washington & Jefferson College
Title: *Every complete atomic Boolean algebra is the ideal lattice of some cBCK-algebra*
Abstract: In this talk, we investigate a particular class of commutative BCK-algebras and study their ideal lattices by way of a specific Galois connection. Using this, we prove the statement of the title, and as a corollary of that theorem show that every discrete topological space is the prime spectrum of some cBCK-algebra.

Speaker: Stefano Fioravanti, Charles University
Title: *On the omission of sublattices of a congruence lattice*
Abstract: We investigate some applications of a certain technique (that we call the Freese's technique), which is a tool for identifying certain lattices as sublattices of the congruence lattice of a given algebra. In particular we gave sufficient conditions for two families of lattices (called the rods and the snakes) to be admissible as sublattices of a variety generated by a given algebra, extending an unpublished result of R. Freese and P. Lipparini.

Speaker: Takehiko Gappo, TU Wien
Title: *Determinacy of long games just beyond fixed countable length*
Abstract: Martin and Harrington showed that the analytic determinacy of games on the natural numbers of length ω is equivalent to the existence of $x^{\#}$ for reals x. The generalization of this for longer games is also known: Trang, Neeman and Woodin showed that the analytic determinacy of games of fixed countable length is equivalent to the sharp for an inner model with (countably) many Woodin cardinals. We show that this equivalence also holds for long games of variable countable length, i.e. games whose length is still countable but determined by the play. The analytic determinacy of a game introduced in the talk is equivalent to the sharp for an inner model with λ many Woodin cardinals, where λ is the order type of Woodin cardinals below λ. This is joint work with Sandra Müller.

Speaker: Sándor Jenei, Eszterházy Károly Catholic University and University of Pécs
Title: *A categorical equivalence for odd or even involutive FL_e-chains*
Abstract: The main objective of this talk is to lift the established one-to-one correspondence, as introduced in [S. Jenei, Group representation for even and odd involutive commutative residuated chains, Studia Logica 110 (2022) 881–922, (2019) arXiv:1910.01404], between the class of even or odd involutive FL_e-chains and the class of bunches of layer groups, to a categorical equivalence [S. Jenei, A categorical equivalence for odd or even involutive FL_e-chains, Fuzzy Sets and Systems, 474(1), 2024, https://doi.org/10.1016/j.fss.2023.108762]. A decomposition method, called *layer algebra decomposition*, which seems to be original not only in the field of residuated lattices but also in algebra at large along with the corresponding construction method, have been introduced for the class of odd or even involutive FL_e-chains. The main idea was to decompose the algebra with the help of its local unit function $x \mapsto x \to x$ into a direct system, indexed by the positive idempotent elements of the algebra, of (hopefully simpler, "nicer") algebras, with transitions of the direct system defined by multiplication by a positive idempotent element. The decomposed algebra could be reconstructed through a combination of Płonka sums and the concept of directed lexicographic order. The impact of the layer algebra decomposition soon extended beyond its initial application and has been employed to structurally describe various classes of residuated lattices. These include finite commutative, idempotent, and involutive residuated lattices [P.Jipsen, O.Tuyt, D,Valota, The structure of finite commutative idempotent involutive residuated lattices, Algebra Universalis 82, 57 (2021), (2020) arXiv:2007.14483], finite involutive po-semilattices [P. Jipsen, M. Sugimoto, On varieties of residuated po-magmas and the structure of finite ipo-semilattices (2022) In: Topology, Algebra, and Categories in Logic 2022], and locally integral involutive po-monoids and semirings [J. Gil-Férez, P. Jipsen, S. Lodhia, The Structure of Locally Integral Involutive Po-monoids and Semirings. In: Glück, R., Santocanale, L., Winter, M. (eds) Relational and Algebraic Methods in Computer Science. RAMiCS 2023. Lecture Notes in Computer Science, vol 13896. Springer, Cham. (2023)] and [J. Gil-Férez, P. Jipsen, M. Sugimoto, Locally Integral Involutive PO-Semigroups, (2023) arXiv:2310.12926]. In these classes layer algebras are "nice". However, in our case the obtained layer algebras are only somewhat nicer than the original algebra, therefore a second phase, involving the construction of layer groups from layer algebras, was introduced. The combination of the layer algebra decomposition and this additional phase establishes a one-to-one correspondence between the class of even or odd involutive FL_e-chains and the class of bunches of layer groups. With the obvious choice for morphisms between FL_e-chains, our primary focus in this talk is to determine the appropriate notion of morphisms for the class of bunches of layer groups, and to present a functor. As a forward-looking note, it's worth noting that the categorical equivalence presented in this talk has proven to be a potent tool for establishing amalgamation and

densification results in classes of involutive FL_e-algebras that are neither integral, nor divisible, nor idempotent.

Speaker: Howy Jordan, University of Colorado Boulder
Title: *Artin gluing of fiber bundles*
Abstract: Given a family of spaces, Artin gluing data specifies a topology on their disjoint union by detailing how open sets from one space sit at the fringe of open sets of another. More generally, this data specifies how to glue toposes together by relating sections of sheaves appropriately. Equivalently (for nice spaces), the data specifies how to glue the corresponding étalé bundles. A natural question is to ask how this data could be used to glue together other bundles, in particular fiber bundles. In this talk we demonstrate that the usual Artin gluing data does induce further Artin gluing data for fiber bundles when the sheaves arise as sheaves of sections of such bundles. Furthermore, we show how natural conditions on a family of Artin gluing data relate to the Whitney A-regularity condition on the resulting stratified bundles.

Speaker: Piotr Kawałek, TU Wien
Title: *Complexity of solving equations in finite algebraic structures*
Abstract: This talk explores the computational complexity of solving equations within finite algebraic structures, specifically focusing on those from congruence modular varieties. We present recent advancements in classifying algebras based on the computational complexity of their equation-solving. Unlike the situation with the Constraint Satisfaction Problem (CSP), where dichotomies are prevalent, our findings introduce strong candidates for NP-intermediate problems, suggesting a nuanced complexity landscape unlikely to be captured by any dichotomy theorem. Furthermore, we establish a novel connection between these algebraic problems and pivotal questions in Circuit Complexity.

Speaker: Derek Levinson, UCLA
Title: *Unreachability of $\Gamma_{2n+1,m}$*
Abstract: We find bounds for the maximal length of a sequence of distinct $\Gamma_{2n+1,m}$-sets under AD and show there is no sequence of distinct Γ_{2n+1}-sets of length δ^1_{2n+3}. As a special case, there is no sequence of distinct $\Gamma_{1,m}$-sets of length $\aleph_{m+2}$. These are the optimal results for the pointclasses Γ_{2n+1} and $\Gamma_{1,m}$.

Speaker: Albert Madinya, Florida Atlantic University
Title: *Topologizing the space of minimal primes of an algebraic frame*
Abstract: An algebraic frame L is a partially ordered set in which every subset of L has a supremum and infimum and satisfies the strong distributive law. Given an algebraic frame L, we can topologize the set of minimal prime elements of L, which we will denote by Min(L). One such way we could topologize Min(L) is with the Hull-Kernel topology as is done with the prime ideals of a commutative ring. The other is the inverse topology which has a similar construction to that of the Hull-Kernel topology. Our aim in this talk to is to study these topological spaces and the interplay that exists between the topological properties of Min(L) and the frame-theoretic properties of L.

Speaker: Eduardo Martinez Mendoza, University of North Texas
Title: *An almost Kurepa Suslin tree with strongly non-saturated square by c.c.c. forcing*
Abstract: In joint work with John Krueger, assuming the square principle for ω_1 we construct a ccc, finite condition forcing that introduces a normal, almost Kurepa Suslin tree T such that $T \times T$ is non-saturated in a stronger sense than the usual. We will discuss the main ideas of the paper, specifically those of g-consistency, strong persistence and ρ-separatedness, which appear to be of great importance to force large families of automorphisms of a given tree.

Speaker: Peter Mayr, University of Colorado Boulder
Title: *Solvable semigroups*
Abstract: Commutators have been generalized from groups to arbitrary algebras in many different ways. I will give an overview of the known properties of the binary term condition commutator and higher commutators from universal algebra specialized to semigroups. In particular I will investigate what the derived notions of nilpotence, supernilpotence, and solvability mean and how they relate to classical concepts in semigroup theory. As it turns out, a finite semigroup is solvable (left and right nilpotent) in the sense of commutator theory iff it is a nilpotent extension of a completely simple semigroup with solvable (nilpotent) subgroups in the sense of semigroup theory. Also a monoid is (left and right) nilpotent with respect to the term condition commutator iff it embeds into a nilpotent group.

Speaker: Chase Meadors, University of Colorado Boulder
Title: *Local finiteness in varieties of MS4-algebras*
Abstract: S4-algebras (or interior algebras) provide semantics for the well-known modal logic S4, and there is a syntactic criterion characterizing when a variety of S4-algebras is locally finite in terms of its "depth" (a classical result of Segerberg and Maksimova). Since the logic MS4 (monadic S4) axiomatizes the one-variable fragment of predicate S4, it is natural to try to generalize the Segerberg–Maksimova theorem to this setting. We discuss several results in this direction. We establish that this theorem naturally extends to a family of subvarieties of MS4 containing, in particular, $\mathrm{S4}_u$ (S4 with a universal modality). On the other hand, we provide a translation of varieties of $\mathrm{S5}_2$-algebras into varieties of MS4-algebras of depth 2 which preserves and reflects local finiteness, demonstrating that the problem of characterizing locally finite varieties of MS4-algebras is at least as hard as the corresponding problem for $\mathrm{S5}_2$ (the bimodal logic of two unrelated S5 modalities), a wide-open problem. Finally, we discuss another natural subvariety of MS4 obtained by asserting a monadic analogue of Casari's predicate formula; this subvariety plays a role in obtaining a faithful provability interpretation of monadic intuitionistic predicate logic, and is expected to have a more manageable characterization of local finiteness.

Speaker: Sebastian Melzer, New Mexico State University
Title: *When is Max(dL) Hausdorff?*
Abstract: In [Papiya Bhattacharjee. Maximal d-elements of an algebraic frame. *Order*,36(2):377–390, 2019], the question was raised whether the spectrum Max(dL) of maximal d-elements of an arithmetic frame with a unit is Hausdorff. We resolve this question in the negative, and characterize when Max(dL) is Hausdorff. Our main machinery is Priestley duality for frames. Specifically, we describe how Max(dL) appears in the Priestley space of an arithmetic frame and use this insight to construct our counterexample.

Speaker: Claudia Mureşan, University of Bucharest
Title: *Congruence Extensions in Congruence–modular Varieties*
Abstract: Following R. Freese & R. McKenzie, we define the *prime congruences* of an algebra A as the prime elements of the lattice $\mathrm{Con}(A)$ of congruences of A w.r.t. the term condition commutator $[\cdot,\cdot]_A$. If $[\cdot,\cdot]_A$ is commutative and distributive w.r.t. arbitrary joins, in particular if A belongs to a congruence–modular variety, then we can construct the *Stone topology* on the set $\mathrm{Spec}(A)$ of the prime congruences of A, called the *prime spectrum* of A, by generalizing the construction of the Zarisky topology from rings.

Using the Stone topology on the prime spectrum, in previous work we have generalized properties of ring extensions to the context of universal algebra, constructed the reticulation in this general setting and studied algebraic properties of lattices of congruences endowed with the commutator operation.

In the current work we investigate the topology induced on the antichain $\mathrm{Min}(A)$ of the minimal prime congruences of A, called the *minimal prime spectrum* of A, by the Stone topology of $\mathrm{Spec}(A)$, and we use the topological structure of $\mathrm{Min}(A)$ to study extensions of universal algebras that generalize certain types of ring extensions. This is joint work with George Georgescu and Leonard Kwuida.

Speaker: Jean Nganou, University of Houston-Downtown
Title: *Quasi-hyperarchimedean BL-algebras.*
Abstract: The notion of hyperarchimedean MV-algebra has been studied extensively [See Sec 6.3 of R. Cignoli, I. D'Ottaviano, D. Mundici.: Algebraic foundations of many-valued reasoning. *Kluwer Academic, Dordrecht*(2000)] . However, when this notion is generalized to BL-algebras, it collapses down to MV-algebras, i.e., every hyperarchimedean BL-algebra is indeed a hyperarchimedean MV-algebra [E. Turunen.: Hyper-Archimedean BL-algebras are MV-algebras. Math. Log. Quart. 53(2) (2007)170–175]. This suggests that this notion may be too stringent and therefore not the proper notion to consider on BL-algebras. By loosening the requirements for hyperarchimedean MV-algebras, E. Dubuc, J. Zilber [E. J. Dubuc, J. C. Zilber.: Some Remarks on Infinitesimals in MV-algebras. *J. of Multiple-Valued Logic & Soft Computing*, 27(6) (2017)647–656] obtained the notion of quasihyperarchimedean MV-algebras and carried out a preliminary investigation. In the same paper, they introduced and studied some classes of ideals in MV-algebras with an emphasis on the relation between them and their comparison to prime ideals as well as maximal ideals.

As BL-algebras constitute one of the most studied generalizations of MV-algebras and the fact that the property of hyperarchimedean forces a BL-algebra to be an MV-algebra, it seemed very natural to consider the extension of the concept of quasihyperarchimedean to BL-algebras. We introduce a new class of BL-algebras called quasihyperarchimedean (q-hyperarchimedean) BL-algebras and investigate some related properties. A filter in a BL-algebra L is a non-empty subset F of L such that: (i) $a, b \in F$ implies that $a \odot b \in F$, and (ii) if $a \in F$, $a \leq b$ with $b \in L$, then, $b \in F$. Furthermore, a proper filter F of L is called prime filter of L if for all $a, b \in L$, $a \vee b \in F$ implies $a \in F$ or $b \in F$. Equivalently, F is a prime filter of L if and only if for all $a, b \in L$, either $a \to b \in F$ or $b \to a \in F$. [S. Motamed, L. Torkzadeh, A. B. Saeid, N. Mohtashamnia.: Radical of filters in BL-algebras. Math. Log. Quart. 57(2) (2011)166–179] defined the notion of radical of filters in BL-algebras and gave some characterizations. We explore the notions of filter, radical of filter and other introduced classes of filters and highlight their roles in the study of quasihyperarchimedean BLalgebras.

Speaker: Ranjitha Raviprakash, New Mexico State University
Title: *Local compactness in MT-algebras*
Abstract: An MT-algebra (McKinsey-Tarski algebra) is a complete boolean algebra equipped with an interior operator. In [G. Bezhanishvili and R. Raviprakash. McKinsey-Tarski algebras: an alternative pointfree approach to topology. *Topology Appl.*, 339:Paper No. 108689, 30 pages, 2023], MT-algebras were proposed as an alternative pointfree approach to topology. In this talk, we continue this line of research and examine local compactness in MT-algebras. We develop an analogue of the Hofmann-Mislove theorem for sober MT-algebras, using which we establish versions of Hofmann-Lawson, Isbell, and Stone dualities for MT-algebras. Generalizing the latter two yield new dualities for locally compact Hausdorff and locally Stone spaces. This is joint work with Guram Bezhanishvili.

Speaker: Bernardo Rossi, Johannes Kepler Universität Linz
Title: *Polynomial completeness properties of finite Mal'cev algebras*
Abstract: Polynomial completeness properties aim at characterizing those functions that are induced by polynomials. For instance, for each unary partial operation f with finite domain D defined on a field $\mathbf{F}$, there exists $p \in \mathbf{F}[x]$ whose induced function attains on D the same values as f. In general, the polynomial operations of an algebra $\mathbf{A}$ are congruence-preserving, but it is not true that each partial operation that preserves the congruences of $\mathbf{A}$ can be interpolated by a polynomial operation of $\mathbf{A}$; e.g, the map $x \mapsto x^2$ preserves the congruences of the group $\mathbb{Z}_4$ but is not induced by a polynomial $\mathbb{Z}_4$. A finite algebra $\mathbf{A}$ is called strictly 1-affine complete if each unary partial operation on $\mathbf{A}$ that preserves the congruences of $\mathbf{A}$ can be interpolated by a polynomial operation of $\mathbf{A}$. In this talk we present some conditions on the congruences and commutators of a finite Mal'cev algebra $\mathbf{A}$ that imply that $\mathbf{A}$ is strictly 1-affine complete. Moreover, we provide a characterization of strictly 1-affine complete congruence regular Mal'cev algebras that extends the characterization of strictly 1-affine complete finite expanded groups by E. Aichinger and P. Idziak from 2024.

Speaker: Catalina Torres, University of Barcelona
Title: *High stationarity and topologies on $\mathcal{P}_\kappa(A)$*
Abstract: Let κ be an uncountable regular cardinal, $\kappa \subseteq A$. We study some notions of n-stationarity on $\mathcal{P}_\kappa(A) := \{x \subseteq A : |x| < \kappa\}$. We develop some of the consequences of those definitions while setting a possible foundational framework for an exploration into the adaptability of results obtained with n-stationarity on ordinals to the more general context of $\mathcal{P}_\kappa(A)$. We construct a sequence of topologies $\langle \tau_0, \tau_1, \cdots \rangle$ which discreteness is characterised by the existence of certain kind of n-stationary sets of $\mathcal{P}_\kappa(A)$.

Speaker: Patrick Wynne, University of Colorado Boulder
Title: *The Finite Basis Problem for Nilpotent Mal'cev Algebras*
Abstract: : A variety of algebras is the class of all algebraic structures in a given signature axiomatized by a given set of equations. A variety is said to be finitely based if there is a finite set of equations that entail all other equations holding in the variety. An algebra is said to be finitely based if the variety it generates is finitely based. We investigate this problem for a large class of 2-nilpotent Mal'cev algebras by decomposing the term functions of the algebra via an associated clonoid between abelian Mal'cev algebras. A clonoid from an algebra A to an algebra B is a set of functions from finite powers of A into B that is closed first with respect to composition with term

functions of A and next with respect to composition with term functions of B. In particular, we show that every finite 2-nilpotent Mal'cev algebra of squarefree order is finitely based.