Contributed Papers
Communications libres
(Org: **Allen Herman** (Regina), **Alexander Litvak** (Alberta) and/et **Karen Meagher** (Regina))

SALEH MUSTAFA, University of Regina
Higher Rank Numerical Ranges for Certain Non-normal Matrices

The concept of higher numerical range was introduced by Choi, Kribs, and Zyczkowski in 2006, as a matrix-analysis tool to find correctable codes for a quantum channel. Concretely, given $T \in M_n(\mathbb{C})$ its k^{th} higher numerical range is the set

$$\Lambda_k(T) = \{\lambda \in \mathbb{C} : \ \exists P \in \mathcal{P}_k(n) : \ PTP = \lambda P\},$$

where $\mathcal{P}_k(n)$ is the set of projections of rank k (i.e., $P \in M_n(\mathbb{C})$ such that $P^2 = P = P^*$ and $\mathrm{Tr}(P) = k$).

The higher numerical ranges of normal matrices are well-understood, but little is known in general, other than the fact that $\Lambda_k(T)$ is always compact and convex. In this talk I will show how to calculate $\Lambda_k(T)$ for certain non-normal matrices T, namely direct sums of Jordan blocks $T = \bigoplus_{j=1}^m J_{n_j}(\alpha)$, and direct sums of the form $T = J_n(\alpha) \oplus \beta I_m$.

HOSSEIN POURALI, DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE, BRANDON UNIVERSITY
ALGEBRAIC AND GRAPH THEORETIC ASPECTS IN LATTICES AND POSETS

In this paper, we introduce the generalized ideal based zero divisor graph of a poset P, denoted by $\widehat{G_I(P)}$. A representation theorem is obtained for generalized zero divisor graphs. Then, we introduce the concepts of primal and weakly primal ideals in lattices. Further, the characterizations of the diameter of the zero divisor graph of a lattice with respect to a non-primal ideal is obtained. Finally, we introduce the equivalence relation $\sim$ on a meet semi-lattice L with 0, $x \sim y$ if and only if $ann(x) = ann(y)$ for $x, y \in L$ and introduce a simple undirected graph $G_E(L)$ of equivalence classes of zero divisors of L whose vertices are the equivalence classes of non-zero zero divisors of L in which two vertices $[x]$ and $[y]$ are adjacent if and only if $[x] \wedge [y] = [0]$.

A. SAROBIDY RAZAFIMAHATRATRA, University of Regina
Erdős–Ko–Rado Theorem for permutation groups

The *Erdős-Ko-Rado* theorem asserts that if $\mathcal{F}$ is a family of k-subsets of $[n]$ where $n > 2k$, then $|\mathcal{F}| \leq \binom{n-1}{k-1}$. Moreover, this bound is sharp and is only attained by families of k-subsets containing a specific element. This theorem can be extended to groups. Two permutations $\sigma, \tau \in \mathrm{Sym}(n)$ are *intersecting* if there exists $i \in [n]$, such that $\sigma(i) = \tau(i)$. A group G, viewed as a permutation group of the set $[n]$, is said to have the *Erdős-Ko-Rado* (EKR) property if families of intersecting permutations are no larger than the size of the stabilizer of a point. Moreover, if only cosets of a stabilizer of a point are the intersecting families that attain this bound, then G is said to have the *strict* EKR property. I will talk about the EKR property and the strict property for 2-transitive and transitive groups.

ZHENYUAN ZHANG, University of Waterloo
On discrete-time self-similar processes with stationary increments

We study the self-similar processes with stationary increments in a discrete-time setting. Different from the continuous-time case, it is shown that the scaling function of such a process may not take the form of a power function $b(a) = a^H$. More precisely, its scaling function has an Ostrowski-type classification. We then focus on the processes with a p-adic type scaling function, give a class of examples, and prove a special spectral representation result for the processes of this type in L^2.