

Rudolf Anton Mathon

(4 July 1940 – 17 May 2022)



It is with great sadness that we mourn the passing of Professor Rudi Mathon on May 17, 2022.

Rudi Mathon was an accomplished researcher in combinatorial design theory with important contributions to finite geometry and designs, and played a pioneering role in computational methods for their construction. His research interests started in numerical analysis as he completed a PhD in Mathematics with thesis entitled “On the Approximation of Elliptic Boundary Value Problems by Fundamental Solutions”, supervised by Professor Robert Laurence Johnston, at University of Toronto in 1972. Reasonably early in his career, his research interests began to expand towards combinatorial designs and combinatorial algorithms. His first articles on these topics were published in 1977: “Computing techniques for the construction and analysis of block designs” (with Peter Gibbons and Derek Corneil, *Utilitas Mathematica* Vol. 11), and “A census of Mendelsohn triple systems of order nine” (with Alex Rosa, *Ars Combinatoria* Vol. 4). In the same year, he also published his most cited article: “The approximate solution of elliptic boundary-value problems by fundamental solutions” with R.L. Johnston in the *SIAM Journal of Numerical Analysis* Vol. 14.

Rudi Mathon earned his first degree in Mechanical Engineering from the Technical University of Prague in 1962. He earned his Master’s in Mathematics in 1971 and PhD in Mathematics in 1972, both from the University of Toronto. He joined the Department of Computer Science at the University of Toronto in 1972, where he became a Full Professor in 1982. He

spent 34 years at the University of Toronto until retiring and becoming an Emeritus Professor in 2006. Rudi Mathon has published 79 journal articles, 3 book chapters, 17 conference papers and edited two books. While the primary focus of his research was combinatorics and design theory, he also had about 10% of his publications in numerical analysis throughout his career. Common themes of his combinatorics research were triple systems, block designs, Steiner systems, symmetric designs, finite geometries, projective planes, partial geometries, strongly regular graphs, isomorphisms and automorphisms of designs, and computational methods in design theory. He had co-authors spread over different continents. Some of his most frequent co-authors were Alex Rosa, followed by Peter Gibbons and Anne Street, then by Charlie Colbourn and Nicholas Hamilton, among many other important design theorists. He served as a member of the editorial board of the *Journal of Combinatorial Mathematics and Combinatorial Computing* (1989-1996), the *Journal of Combinatorial Designs* (1992-2008) and the *Australasian Journal of Combinatorics* (since 1995).

Rudi Mathon is famous for using computational methods combined with mathematical methods to classify designs, to search for rare designs and to prove the non-existence of designs. One example is the complete classification of planes of order 16 announced in a conference in 1992, which included the discovery of a new projective plane of order 16 called the Mathon plane by Marialuisa Resmini (“On the Mathon plane”, *Journal of Geometry* Vol. 60, 1997). Another discovery from later in his career is found in the article “New maximal arcs in Desarguesian planes”, which he published in the *Journal of Combinatorial Theory Series A* Vol. 97 (2002). In this paper, a new family of maximal arcs in Desarguesian projective planes is presented together with a classification for planes of order 16, 32 and 64. These are the first new maximal arcs in $PG(2, q)$ discovered since the pioneering work of Denniston in 1969 and Thas in 1974, yielding new partial geometries, Steiner 2-designs and optimal 2-weight codes. Other examples of important discoveries can be found in his extensive list of publications. He has also written some remarkable book chapters, which are key references in design theory. His 3rd most cited paper is “ $2-(v, k, \lambda)$ designs of small order” with Alex Rosa, which is Chapter II.1 in the *Handbook of Combinatorial Designs*, 2nd Edition, 2006. This includes complete lists of block designs of small order and a table spanning 22 pages of all admissible parameters with known existence and enumeration results for designs with replication number smaller than or equal to 41. He is also a co-author with Charlie Colbourn of the Chapter II.5 “Steiner Systems” of the same handbook, which is among his seven most cited papers.

I was very fortunate to be one of Rudi Mathon's PhD students, and I conclude this note with some personal remarks about my experience with him as a supervisor and friend. Rudi radiated enthusiasm for mathematical discovery. It appears to me that he regarded combinatorial designs as rare gems, and computers and algorithms as instruments used to mine for them. His ultimate goal was to find the gems, but he also paid attention to developing his craft of efficient algorithm design and effective computational methods, which he passed on to the next generation of researchers. The door of his office was always open, and as a student, I was always welcome to drop by at any time. Very often I would find him on his computer, writing programs or verifying results of his ongoing computational searches. Then, he would share some details of the particular gems he was looking for: their properties, their symmetries, their beauty. His eyes would glitter and in those moments we could catch a glimpse of his appreciation for the beauty in combinatorial structures. He was always generous with his time as a supervisor, and also very strict about not accepting co-authorships if he felt he did not make substantial contributions to the contents of a paper. For example, in my case, I do not have a single paper co-authored with Rudi, even when he was the one asking the main question, meeting me weekly to discuss progress towards the solution, and even doing many rounds of proofreading until the final paper was ready. He was a dear colleague at the university and would spend time each morning at the graduate lounge having coffee with other professors and students, discussing science, academic issues and life in general. Another characteristic of Rudi was being "low-key", doing remarkable things without self-promotion. When writing this note, I noticed that there was not much information available online about Rudi. On the other hand, I was happy to find a new Google Scholar page for Rudi including a recent photo and a reference to his latest publication, with Mustafa Gezek and Vladimir Tonchev in the *Electronic Journal of Combinatorics* Vol. 27 (2020). I am sure much more could be said of Rudi Mathon's accomplishments by other members of the combinatorics and numerical analysis communities and I hope others may follow with their testimonies.

The last time I met with Rudi was in Hawaii in February 2019, by a remarkable coincidence. He seemed to be enjoying his retirement in the company of his wife Helen. He was active and enjoying conversations, walks and travel. Rudi Mathon will for sure be missed by researchers in combinatorial designs and by his family, friends, colleagues and students. His friendly smile will be remembered by many whose life he touched. He passed away on May 17, 2022, at age 81. My condolences go to his wife Helen and his son Erik.

— Lucia Moura (November, 2022)



Rick Wilson, Timothy Tillson and
Rudi. Montreal, 1978.



Rudi, Alex Rosa and
Charlie Colbourn.
Baton Rouge, 1981.



Rudi in Kyoto, 1986.



Rudi in New Zealand, 1986.



Rudi in Guildford.
British Combinatorics
Conference 1991.



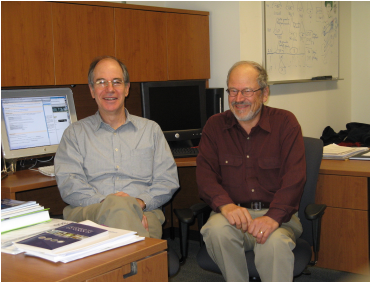
Toronto, 1993.
Eric Mendelsohn, Charlie Colbourn,
Rudi and Alan Hartman.



Bose Memorial Conference, 1995.
Fort Collins, Colorado.
Rudi,
Doug Stinson and
Jeff Dinitz.



Rudi and graduate students,
Hamilton, ~1995
Lucia Moura (PhD 1999),
Luis Dissett (PhD 2000),
Ioana Mihaila (MSc 1995) and
Ali Mahmoodi (PhD 1996).



Peter Gibbons and Rudi.
University of Toronto, 2007.



Peter Gibbons, Spyros Magliveras,
Rudi, Jeff Dinitz, Daniel Panario,
and spouses celebrate Alex Rosa's
70th birthday. Bratislava, 2007.



Hawaii, February 2019.
Helen Freund Mathon, Daniel Panario, Lucia Moura and Rudi.