

Monoidal Topology describes an active research area that, after various past proposals on how to axiomatize “spaces” in terms of convergence, began to emerge at the beginning of the millennium. It combines Barr’s relational presentation of topological spaces in terms of ultrafilter convergence with Lawvere’s interpretation of metric spaces as small categories enriched over the extended real half-line. Hence, equipped with a quantale V (replacing the reals) and a monad \mathbb{T} (replacing the ultrafilter monad) laxly extended from set maps to V -valued relations, the book develops a categorical theory of (\mathbb{T}, V) -algebras that is inspired simultaneously by its metric and topological roots. The book highlights in particular the distinguished role of equationally defined structures within the given lax-algebraic context and presents numerous new results ranging from topology and approach theory to domain theory. All the necessary pre-requisites in order and category theory are presented in the book.

Dirk Hofmann is an assistant professor at the University of Aveiro, Portugal. He received his Ph.D. from the University of Bremen (Germany) in 1999. His research interests focus on the development and application of categorical methods in mathematics, primarily in algebra and topology, but also in logic and computer science. Over the past ten years he has contributed significantly to the development of the theory presented in this book, and beyond. He is also well known for his contributions to duality theory.

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Walter Tholen is a professor of mathematics at York University, Toronto, and an internationally recognized specialist of category theory and its applications to algebra, topology, and computer science. His work encompasses some 120 published papers on various subjects, ranging from the fundamental study of categories (in particular, of monads, factorization systems, and closure operators) to their applications (in particular, in general topology, homotopy theory, duality theory). Twelve students wrote their Ph.D. theses under his supervision. He has co-authored several books and serves on various editorial boards. He is also an engaged academic administrator, currently serving as Associate Vice-President Research of the university.

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