

The algebraic structure of quandle rings.

Mohamed Elhamdadi

University of South Florida Tampa

Quandles are sets with binary operations satisfying three axioms coming from the three Reidemeister moves in knot theory. Quandles were introduced independently by David Joyce and Sergei Matveev in the 1980s. Quandles have important applications in low dimensional topology. Linearization of these objects gives rise to the notion of a quandle ring. The subject is a meeting place for quandle theory and ring theory. We will survey recent works on the subject, such as power associativity of quandle rings, isomorphisms problem, the problem of idempotents in quandle rings, Derivations, the Pierce spectrum, and will state some conjectures. A few References: [1] V.G. Bardakov, I.B.S. Passi, M. Singh, Quandle rings, *J. Algebra Appl.* 18 (2019) 1950157. [2] V.G. Bardakov, I.B.S. Passi, M. Singh, Zero-divisors and idempotents in quandle rings, *Osaka J. Math.* 59 (2022) 611–637. [3] M. Elhamdadi, N. Fernando, B. Tsvetikhovskiy, Ring theoretic aspects of quandles, *J. Algebra* 526 (2019) 166–187. [4] Elhamdadi, M., Nunez, B., Singh, M., Swain, D.: Idempotents, free products and quandle coverings. *Int. J. Math.* 34, 2350011 (2023). [5] Elhamdadi, M., Nunez, B., Singh, M.: Enhancements of link colorings via idempotents of quandle rings. *J. Pure and Appl. Algebra* 227, 16 (2023).

In Special Session 18 on Automorphisms, Derivations, and Identities of Algebras at the Mathematical Congress of the Americas 2025.