Factorizations of polynomials with integral non-negative coefficients

Federico Campanini

Abstract. We study the structure of the commutative multiplicative monoid $\mathbb{N}_0[x]^*$ of all the non-zero polynomials in $\mathbb{Z}[x]$ with non-negative coefficients. We first recall some important tools for investigating non-unique factorizations in monoids (sets of lengths, elasticity, catenary degrees, etc.), and we show that $\mathbb{N}_0[x]^*$ is surprisingly very far from being factorial. Then, we describe prime elements and prime ideals of $\mathbb{N}_0[x]^*$, and we conclude with some open problems.

The talk is based on joint work with Alberto Facchini.

About the speaker. The speaker earned a PhD in Pure Mathematics from the University of Padua (Italy) in 2019. He is currently a postdoc researcher (chargé de recherche FNRS) at the Université catholique de Louvain (Belgium), working as a member of the Category Theory group of the Institue de Recherche en Mathématique et Physique (IRMP).

His research interests are quite diverse and cover substantially different areas of Commutative and Non-Commutative Algebra, Module Theory, Category Theory, as well as aspects of Topology, Homological Algebra, Logic, and Representation Theory. He has published papers on the following topics: (1) direct-sum decompositions in additive and module categories; (2) Prüfer-like conditions in commutative rings with zero divisors; (3) factorization theory for monoids; (4) homological algebra; (5) torsion theories in general categories; (6) topos theory and internal categories; (7) topological methods in commutative and non-commutative algebra. Some of his work has appeared in renowned international journals such as Advances in Mathematics and the Israel Journal of Mathematics.

References

[1] F. Campanini and A. Facchini, *Factorizations of polynomials with integral non-negative coefficients*, Semigroup Forum **99** (2018), 317–322 (arXiv:2504.12145).

[2] P. Cesarz, S.T. Chapman, S. McAdam, and G.J. Schaeffer, "Elastic properties of some semirings defined by positive systems", pp. 89–101 in: M. Fontana, S.-E. Kabbaj, B. Olberding, and I. Swanson (eds.), *Commutative Algebra and its Applications*, de Gruyter, 2009.

Institute de Recherche en Mathématique et Physique, Université catholique de Louvain | Louvain-la-Neuve 1348, Belgium

E-mail: federico.campanini@uclouvain.be

Web page: https://sites.google.com/view/federicocampanini/home-page