The aim of the project *Arithmetic properties of special integer sequences, polynomials and continued fractions* will be to obtain new results concerning number theoretic properties of certain polynomial sequences and their coefficients associated with partitions and compositions of natural numbers with elements from a set $A \subset \mathbb{N}$. We will also be interested in the last nonzero digits of the values of polynomials with integer coefficients and other special functions with integer values. In addition, we will study the occurrence of certain finite words in the continued fraction expansions of the higher-order roots of prime numbers and other functions. More precisely, the project is naturally divided into four parts.

The first part of the project will be devoted to the study of the automaticity of the last nonzero digits of the expansions in integer bases of polynomial values and certain functions of interest from an arithmetic point of view. Let us remind you that an infinite sequence is called automatic if there is a finite-state machine that generates it. The question regarding the automaticity of the last digits of the $n!$ in various bases is classic and has been solved in large part. We will be interested in the natural generalization of the factorial function given by the product of consecutive values of a given polynomial and other functions given by some binomial coefficients.

The second part of the project will be devoted to the study of partition and composition polynomials associated with a set A. Let us recall that the A-partition of the natural number n is a representation of n as a sum of elements from the set A. Partitions with parts in sets interesting from the arithmetic point of view are a classic object of research in number theory and discrete mathematics. The nth partition polynomial is defined as the only nth degree polynomial whose ith coefficient is the number of A-partitions of n with exactly i parts. Examination of the coefficients of these polynomials for a fixed value of i gives an insight into the quantitative structure of number of A-partitions of n. In particular, we will be interested in the questions concerning the automaticity (the regularity), the vanishing at the roots of unity, and other arithmetic properties. Similar studies will be carried out for the polynomials associated with compositions.

The third part of the project will be devoted to the study of the coefficients of the Taylor expansion of the formal power of the generating function for a sequence counting partitions with elements from the set A. The value of the nth polynomial coefficient evaluated at a positive integer k has a natural combinatorial interpretation, i.e., it gives the number of k-colored A-partitions. We will be interested in the vanishing of the polynomial values at roots of unity and negative integers and other arithmetic properties.

The last part of the project deals with problems related to the occurrence of fixed finite words in the continued fraction expansions of higher-order roots of prime numbers and other sequence, both in the context of classic continued fractions as well as their multidimensional generalizations. The generalization of Gosper's algorithm from the classic (one-dimensional) to the multidimensional case will also be examined.

The results obtained during the project will be published in international journals and presented at seminars and conferences (national and international).