

PREFACE

The conference *On the Interfaces of Number Theory and Special Functions with Computer Algebra* was conceived as a forum to highlight the deep and evolving connections among three central areas of modern mathematics: number theory, special functions, and computer algebra. Each of these disciplines has witnessed remarkable progress in recent decades. At the same time, their interactions have become increasingly significant, generating new methods, new results, and new perspectives that enrich all three fields.

The primary aim of this conference has been to provide a comprehensive overview of recent developments in analytic and algebraic number theory, the theory of special functions, algebra, modular forms and their applications, as well as advances in computer algebra. Beyond presenting these topics individually, the conference has emphasized the fertile interfaces between them—where computational techniques inform theoretical breakthroughs, where special functions illuminate arithmetic phenomena, and where algebraic structures unify diverse mathematical ideas.

A central objective of the meeting has been to foster a collaborative and supportive research environment, particularly for young researchers. By encouraging participants to present their latest findings and actively engage in discussions, the conference has created a dynamic platform for the exchange of ideas and the formation of new collaborations. The diversity of backgrounds and perspectives represented here reflects the truly international and interdisciplinary character of contemporary mathematical research.

Support for the conference came from ATNANL Laboratory (FSM), University of Monastir (UM), Mathematical Society of Tunisia (SMT), University of Sousse (US) and Mediterranean Institute for the Mathematical Sciences (MIMS).

The plenary talks were delivered by some of the most prominent number theorists: Abdulaziz Alanazi (KSA), Gautami Bhowmik (France), M. P. Chaudhary (India), M. Chems-Eddin (Morocco), Mohamed Hbaib (Tunisia), Sana Hizem (Tunisia), Kağan Kurşungöz (Turkey), Darlison Nyirenda (South Africa), Sergey Sekatskii (Switzerland), Bouchaib Sodaigui (France), and Mohammed Taous (Morocco). Each talk offered a rich blend of historical surveys and cutting-edge research developments to which the speakers themselves have significantly contributed. The lectures were widely attended and sparked engaging discussions that continued during the long coffee breaks that followed.

The present proceedings collect refereed and accepted collection of submitted original research papers, reflecting the breadth of its themes and the depth of current investigations. The volume includes the following contributions:

- (1) *On n -tuple product rules for the q -gamma function $\Gamma_q(z)$ and representation of this and related functions via other analytic functions*
- (2) *An Alternative Generating Function for k -Regular Partitions*
- (3) *On the Density of 2-Class Groups of Pure Quartic Number Fields $K = \mathbb{Q}(\sqrt[4]{2d^2})$*
- (4) *On (p, i) -Regular Quadratic Number Fields*
- (5) *Bi-Periodic Fibonacci Zeta Function and Related L -Functions*
- (6) *On the Equation $X^2 - \varepsilon_2 \varepsilon_{p_1 p_2} \varepsilon_{2 p_1 p_2} = 0$ for Some Fundamental Units ε_i*
- (7) *A New Generalization of the Euler Totient Function*
- (8) *S - α -Generated Rings and Modules*
- (9) *The 2-Iwasawa Module over Certain Octic Elementary Fields*
- (10) *Iwasawa Lambda Invariant of Some Imaginary Number Fields*

These contributions demonstrate significant advances in special functions, partition theory, class groups, Iwasawa theory, algebraic number theory, and algebraic structures. They also illustrate the powerful role of analytic and computational methods in addressing deep arithmetic questions.

We express our sincere gratitude to all participants and contributors for their valuable presentations and discussions, which have made this conference both stimulating and successful.

It is our hope that this proceeding will serve as a valuable reference for researchers and will inspire further exploration at the rich interfaces of number theory, special functions, and computer algebra.