Abstracts of ELAZ 2026
16-21 February 2026
Strobl, Austria

FWF Österreichischer Wissenschaftsfonds

TU Graz

Monday	Monday	Tuesday	Tuesday	Wednesday	Wednesday	Thursday	Thursday	Friday	Friday	Saturday	Saturday
		9.00	Opening: Elsholtz							**CLEAR your room!!**	
			Chair: Heath-Brown		**Chair: Brüdern**		**Chair: Richter**		**Chair: Widmer**		**Chair: Pintz**
		9.05-9:45	Brüdern	9.05-9.45	Bloom	9.05-9.45	Newton	9.05-9.45	Blomer	9.25-10.05	Teräväinen
		9:50-10.30	Stadlmann	9.50-10.30	Bettin	9.50-10.30	Dartyge	9.50-10.30	Dietmann	10.15-10.55	Schlage-Puchta
			coffee	**coffee**		10.35-10.55	Swaenepoel		**coffee**	11.05-11.20	solutions to
			Chair: Aistleitner		**Chair: Pach**				**Chair: Assing**		open problems?
		11.00-11.20	Myerson	11.00-11.20	Pintz	LUNCH packages!		**Chair: Assing**	Bedert	The end	
		11.25-11.45	Rena Chu	11.25-11.45	Ding			**Chair: Assing**	Kimmel		
		11.50-12.20	Five 5 minutes talks	11.50-12.20	Five 5 minutes talks:	**11.40 Bus at bifeb**		**Chair: Assing**	Pilatte		
			Biro, Minelli, Ohst, Vukusic,		Wurzinger, Garunkstis						
			Theorin Johansson		Simenas, Pohl, Diao						
12.30	lunch	12.30	lunch	12.30	lunch	12.30	**NO LUNCH!!**	12.30	lunch	**12.00(!!)**	**lunch**
			Chair: Frei		**Chair: Kuperberg**				**Chair: Dartyge**		
		14.30-14.50	Bernert	14.30-14.50	La Bretèche			14.30-14.50	Pascadi		
14.45	**coffee**	14.55-15.20	Four 5 minutes talks	14.55-15.15	Zaccagnini			14.55-15.15	Bazin		
			Anupindi, Broucke, Dede, Greven	15.20-15.50	Five 5 minutes talks:	FREE	AFTERNOON	15.20-15.40	Verzobio		
		15.25-15.45	Florian Wilsch		Führer, Prakash, Paliulionytė, Song, Singha Roy						
	Graz-seminar		**Coffee and posters**		**Coffee and posters**				**coffee**		
Chair	**Tichy**		**Chair: Julia Brandes**		**Chair: Bloom**				**Chair: Maier**		
16.20-16.40	Bonolis	16.15-16.55	Richter	16.20-17.00	Pach			16.10-16.30	Munsch		
16.45-17.05	Wu	17.00-17.20	Grimmelt	17.05-17.25	Roche-Newton			16.35-16.55	Wang		
17.15-17.35	Soffer-Aranov	17.25-17.45	Halupczok					17.00-17.20	Assing		
18.00	dinner	18.00	dinner	18.00	dinner	18.00	dinner	18.00	dinner		
				19.30-open	Heath-Brown, problem session						
				(20.45)	(planning ELAZ 2028/30)						

ELAZ was initiated by Prof. Lutz G. Lucht. The first conference took place in 2000 (organized by Lutz G. Lucht with some help by C. Elsholtz.)

It grew from a Germany-based conference into a regular European conference series. The acronym ELAZ stands for Elementare und analytische Zahlentheorie, (Elementary and analytic number theory).

List of ELAZ conferences 2000-2026

2000: Goslar (organized by Lutz. G. Lucht, TU Clausthal; with C. Elsholtz, M. Traupe)
2002: Freiburg (organized by Dieter Wolke)
2004: Mainz (organized by Wolfgang Schwarz, with Jörn Steuding)
2006: Blaubeuren (organized by Eduard Wirsing, Helmut Maier)
2010: Göttingen (organized by Valentin Blomer and Jörg Brüdern)
2012: Schloss Schney (organized by Jörn Steuding, Rasa Steuding, Thomas Christ, Nicola Oswald)
2014: Hildesheim (organized by Jürgen Sander, with Martin Kreh, Jan-Hendrik de Wiljes)
2016: Strobl, Austria (organized by Christian Elsholtz, Robert Tichy)
2018: Bonn (MPI) (organized by Pieter Moree, with Kathrin Bringmann and Stephan Ehlen, Advisory Board: Christian Elsholtz).
(2020 postponed, due to pandemy)
2022: Poznan, Poland, (organized by Jerzy Kaczorowski, Łukasz Pańkowski, and Maciej Radziejewski.)
2024: Rostock (Jan-Christoph Schlage-Puchta)
2026: Strobl (Austria) (Christian Elsholtz; with Christoph Aistleitner, Christopher Frei, Robert Tichy)

Participants of ELAZ 2026

1. Aistleitner, Christoph
2. Anupindi, Vishnupriya
3. Assing, Edgar
4. Bazin, Pierre-Alexandre
5. Bedert, Benjamin
6. Bernert, Christian
7. Bettin, Sandro
8. Bienvenu, Pierre
9. Biro, Andras
10. Blomer, Valentin
11. Bloom, Thomas
12. Bonolis, Dante
13. Brandes, Julia
14. Broucke, Frederik
15. Brüdern, Jörg
16. Chu, Rena
17. Comtat, Félicien
18. Dartyge, Cécile
19. Dede, Tammo
20. Diao, Yijie
21. Dietmann, Rainer
22. Ding, Yuchen
23. Drmota, Michael
24. Elsholtz, Christian
25. Frei, Christopher
26. Führer, Jakob
27. Glas, Jakob
28. Garçonnet, Olivier
29. Garunkštis, Ramūnas
30. Gerspach, Maxim
31. Greven, Anouk
32. Grimmelt, Lasse
33. Halupczok, Karin
34. Hametner, Paul
35. Hansen, Willem
36. Hauke, Manuel
37. Heath-Brown, Roger
38. Jelinek, Pascal
39. Kimmel, Noam
40. Kokkinos, Michalis
41. Kuperberg, Vivian
42. La Bretèche, Régis de
43. Linn, Johannes
44. Madritsch, Manfred
45. Maga, Péter
46. Maier, Helmut
47. Manskova, Maryna

48. Mermet, Loïc
49. Migliaccio, Alessandra
50. Minelli, Paolo
51. Mounier, Adrien
52. Munsch, Marc
53. Myerson, Simon
54. Newton, Rachel
55. Ohst, Marvin
56. Pach, Péter Pál
57. Paliulionytė, Julija
58. Pascadi, Alexandru
59. Pieropan, Marta
60. Pilatte, Cedric
61. Pintz, János
62. Pohl, Sarah Sophie
63. Porath, Hannah
64. Prakash, Om
65. Ramaré, Olivier
66. Rampal, Timothée
67. Richter, Florian
68. Rivat, Joël
69. Roche-Newton, Oliver
70. Rome, Nick
71. Saad-Eddin, Sumaia
72. Schäfer, Leo
73. Schlage-Puchta, Jan-Christoph
74. Shankar, Susheel
75. Šimėnas, Raivydas
76. Singha Roy, Akash
77. Soffer-Aranov, Noy
78. Song, Yutong
79. Sourmelidis, Athanasios
80. Spiegelhofer, Lukas
81. Stadlmann, Julia
82. Swaenepoel, Cathy
83. Technau, Marc
84. Teräväinen, Joni
85. Theorin Johansson, Anna
86. Tichy, Robert
87. Verzobio, Matteo
88. Vukusic, Ingrid
89. Wang, Mengdi
90. Warren, Audie
91. Wessel, Mieke
92. Widmer, Martin
93. Wilsch, Florian
94. Wu, Hao
95. Wurzinger, Lena
96. Zaccagnini, Alessandro
97. Zafeiropoulos Agamemnon
98. Zanoli, Anna

Sum-free functions

Vishnupriya Anupindi

A vectorial boolean function $f : \mathbb{F}_2^n \to \mathbb{F}_2^n$ is called k-th order sum-free if for every k-dimensional affine subspace A of $\mathbb{F}_2^n$,

$$\sum_{x \in A} f(x) \neq 0.$$

In this talk, we will look at functions that satisfy this property.

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On Fourier coefficients of Siegel modular forms

Edgar Assing

Fourier coefficients of modular forms often show up in connection with interesting arithmetic problems. For example, Siegel modular forms and their Fourier coefficients arise naturally when studying representation numbers of quadratic forms by forms. For this and other applications it is import to have good control on the size of the Fourier coefficient, so that proving bounds for Fourier coefficients of Siegel modular has become a classical challenge in analytic number theory. For degree two forms the current best bound is due to Kohnen and is already 30 years old. In this talk we will discuss how an old trick of Iwaniec can be used to produce new bounds in certain ranges.

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Lower bounds on exponential sums

Pierre-Alexandre Bazin

We develop a new large sieve-based technique to obtain lower bounds on exponential sums. We are in particular able to show the lower bound on the sum over primes

$$\sup_{n\le x}\left|\sum_{p\le n} e^{2i\pi\alpha p}\right| \gg x^{1/6-\varepsilon}$$

uniformly in α.

References: Pierre-Alexandre Bazin, Exponential sums over primes are unbounded, arXiv preprint. arXiv:2508.18394

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Improved bounds towards the Lonely Runner Conjecture

Benjamin Bedert

The celebrated lonely runner conjecture of J. Wills and T. Cusick asserts that if n runners with distinct constant speeds run around the unit circle, starting at a common time and place, then each runner will at some time be separated by a distance of at least $\frac{1}{n}$ from all other runners. A weaker lower bound of $\frac{1}{2n-2}$ follows from the so-called trivial union bound, and subsequent work upgraded this to bounds of the form $\frac{1}{2n} + \frac{c}{n^2}$ for various constants $c > 0$. T. Tao strengthened this by a logarithmic factor, obtaining the previous record bound $\frac{1}{2n} + \frac{(\log n)^{1-o(1)}}{n^2}$. In our work, we obtain a polynomial improvement of the form

$$\frac{1}{2n} + \frac{1}{n^{5/3+o(1)}}.$$

References:

T. W. Cusick, View obstruction problems, Aequationes Math. (9), 1973, 165–170.

T. Tao, Some remarks on the lonely runner conjecture, Contrib. Discrete Math. (13), 2018, 1–31.

J. M. Wills, Zwei Probleme der inhomogenen diophantischen Approximation, Ph.D. Thesis, 1965.

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The exceptional set in the abc conjecture

Christian Bernert

We bound the number of possible exceptions to the abc conjecture. The proof uses a combination of tools from the geometry of numbers, Fourier analysis and the determinant method. This is joint work with T. Browning, J.D. Lichtman and J. Teräväinen.

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Fourier series with automorphic coefficients

Sandro Bettin

Given a Fuchsian group Γ and an automorphic form ϕ for Γ, let a_n be the coefficients of the Fourier expansion at ∞ of ϕ. For example, we can take a_n to be a normalized convolution of Dirichlet characters $(\chi_1 * \chi_2)(n)/\sqrt{n}$ or the normalized Ramanujan's tau-function $\tau(n)/n^6$. We study the asymptotic distribution of

$$F_1(x) := \sum_{n=1}^{\infty} a_n e^{2\pi i n x} e^{-n/d_x^2}, \quad x \in \mathbb{Q},$$

with d_x being the denominator of x. We show that as $Q \to \infty$ the values

$$\left\{ \frac{F_1(x)}{\sigma_\phi \sqrt{\log Q (\log\log Q)^\beta}} \;\Big|\; x \in \mathbb{Q} \cap [0,1],\ d_x \leq Q \right\},$$

converge in distribution to a standard complex gaussian, for some $\sigma_\phi > 0$. Notice that F_1 is essentially a modular symbol, so this extends work of Petridis and Risager and of Nordentoft who proved this result for forms that are either of level 1 or cuspidal and holomorphic. We also consider a "continuous" version of this result, estabilishing a central limit theorem also for

$$F_2(x; Q) := \sum_{n \leq Q} a_n e^{2\pi i n x},\ x \in [0,1]$$

as $Q \to \infty$.

Coauthors: S. Drappeau, J. Lee

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An inner product formula for certain automorphic functions

András Biró

We describe a formula expressing the inner product of two automorphic kernel functions by means of class numbers of pairs of binary quadratic forms. We mention briefly its two applications: to the hyperbolic circle problem, and to a summation formula involving Fourier coefficients of half-integral weight Maass forms.

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Statistics of modular inverses

Valentin Blomer

For a natural number c we consider the modular hyperbola $\{(a/c, \bar{a}/c) \mid (a, c) = 1\}$ as a subset of the two-dimensional torus and investigate how randomly the points are distributed. This leads to an analysis of various character and exponential sums.

Numbers with small digits in multiple bases

Thomas Bloom

An old conjecture of Graham asks whether there are infinitely many integers n such that $\binom{2n}{n}$ is coprime to 105. This is equivalent to asking whether there are infinitely many integers which only have the digits 0,1 in base 3, 0,1,2 in base 5, and 0,1,2,3 in base 7. In general, one can ask whether there are infinitely many integers which only have 'small' digits in multiple bases simultaneously. For two bases this was established in 1975 by Erdos, Graham, Ruzsa, and Straus, but the case of three or more bases is much more mysterious. I will discuss recent joint work with Ernie Croot, in which we prove that (assuming the bases are sufficiently large) there are infinitely many integers such that almost all of the digits are small in all bases simultaneously.

Coauthors: Ernie Croot

University of Manchester

On the 2-torsion in class groups of number fields

Dante Bonolis

In 2020, Bhargava, Shankar, Taniguchi, Thorne, Tsimerman, and Zhao proved that for a finite extension $K/\mathbb{Q}$ of degree $n \geq 5$, the size of the 2-torsion class group is bounded by $\#h_2(K) = O_{n,\varepsilon}(D_K^{\frac{1}{2}-\frac{1}{2n}+\varepsilon})$, where D_K is the absolute discriminant of K. In this talk we will improve their bound by proving that $\#h_2(K) = O_{n,\varepsilon}(D_K^{\frac{1}{2}-\frac{1}{2n}-\delta_K+\varepsilon})$, for a constant $\delta_K > 0$.

References

[HB84] D.R. Heath-Brown, *The Square Sieve and Consecutive square-free Numbers.* Math. Ann., Vol. 266 No. 3, (1984), 251–259.

[Pie06] L.B. Pierce, *A bound for the 3-part of class numbers of quadratic fields by means of the square sieve.* Forum Math., Vol. 18 No. 4, (2006),, 677–698.

[Sal22] P. Salberger *Bounds on 2-torsion in class groups over number fields.* Oberwolfach report, Vol.50 (2022), 1252–1252.

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On moments of the Erdős–Hooley Delta-function

Régis de la Bretèche

your abstract in simple latex. Avoid macros!

Recently, Koukoulopoulos and Tao have developed a new method for bounding the mean value of the Erdős–Hooley Delta-function. We explain their method and how to slightly improve their results. We can adapt it to handle the weighted moments of the Erdős–Hooley Delta-function.

Coauthors: Gérald Tenenbaum

References: R. de la Bretèche & G. Tenenbaum, On moments of the Erdős–Hooley Delta-function, 2026, preprint.

R. de la Bretèche & G. Tenenbaum, Mean values of arithmetic functions and application to sums of powers, *Math. Proc. Camb. Phil. Soc.*, to appear.

R. de la Bretèche & G. Tenenbaum, Note on the mean value of the Erdős-Hooley Delta function, *Acta Arith.* 219.4 (2025), 379–394.

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Moment estimates for the Riemann zeta function

Frederik Broucke

In 2009 Soundararajan showed that the Riemann hypothesis implies the following moment bounds for the Riemann zeta function: for $k > 0$ and every $\varepsilon > 0$,

$$\int_0^T |\zeta(1/2+it)|^{2k} dt \ll_{k,\varepsilon} T(\log T)^{k^2+\varepsilon}.$$

In this talk, we show that the full strength of the Riemann hypothesis is not needed. Rather, one can get moment bounds if the number of exceptions to the Riemann hypothesis is sufficiently small (measured in some quantitative way). Coauthors: Winston Heap

References: K. Soundararajan, Moments of the Riemann zeta function, Ann. Math. 170, 2009, 981–993.

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On Waring's problem: one square and two cubes

J. Brüdern, Göttingen

The ternary problems of Waring's type are notoriously difficult. Although Hardy and Littlewood may have thought that their method reduces these problems to congruence conditions that decide about solubility when the number to be represented is large, we now know better. Brauer obstructions get in the way, and we are far from satisfactory results. Analytically this reflects in the singular series being convergent only conditionally.

Following a survey that describes the state of the art, we sketch out a new result concerning the number of representations of the natural number n as the sum of one square and two positive cubes: the expected Hardy-Littlewood asymptotics for this number is true for all but $O(N^{6/7+\varepsilon}$ of the $n \leq N$. The more original parts of this talk are joint with Koichi Kawada.

Short character sums evaluated at homogeneous polynomials

Rena Chu

Let p be a prime. Bounding short Dirichlet character sums is a classical problem in analytic number theory, and the celebrated work of Burgess provides nontrivial bounds for sums as short as $p^{1/4+\varepsilon}$ for all $\varepsilon > 0$. In this talk, we will first survey known bounds in the original and generalized settings. Then we discuss the so-called "Burgess method" and present new results that rely on bounds on the multiplicative energy of certain sets in products of finite fields.

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Prime numbers with an almost prime reverse I

Cécile Dartyge

Let $b \in \mathbb{N}$, $b \geq 2$. The reverse in base b of an integer n is the integer obtained by reversing the order of its digits. We prove that there exists $\Omega_b \in \mathbb{N}$ such that for infinitely many prime numbers p, the reverse of p has at most Ω_b prime factors. For each b, our method provides an explicit admissible value of Ω_b. This result is a consequence of a Bombieri-Vinogradov type theorem on the distribution of the reverses of the primes in arithmetic progressions, combined with sieve methods. An important part of the proof is the estimate of some type II sums associated to this problem.

Coauthors: Joël Rivat and Cathy Swaenepoel

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Small solutions to linear forms in primes

Tammo Dede

We show that a positive proportion of linear forms in at least 4 variables admit a prime solution that is as small as heuristically expected. In particular we find that 100% (in a density sense) of linear forms satisfying some local conditions admit small solutions.

References:

T.Browning et al., The Hasse principle for random Fano hypersurfaces, Annals of Mathematics 197, 2023, 1115-1203.

T.Dede, Small solutions to linear forms in primes, arXiv:2504.00700, 2025.

P. Holdridge, Random diophantine equations in the primes ii., arxiv:2310.02137, 2023.

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Density of rational points on del Pezzo surfaces of degree one

Yijie Diao

Assuming the parity conjecture, we prove that with probability one, for certain families of degree one del Pezzo surfaces ordered by height, the set of rational points is Zariski dense.

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Some recent progress on cubic forms

Rainer Dietmann

In this talk I want to report on some recent progress on two classical arithmetic problems for cubic forms: First, I want to discuss the question of existence of rational lines on cubic hypersurfaces. In particular, I want to present joint work with Julia Brandes and David Leep which shows that every cubic hypersurface of dimension at least 33 defined over a number field K contains a K-rational line, reducing Wooley's previous bound by two. For $K = \mathbb{Q}$, we can further lower the bound to 29 by using recent work of Bernert and Hochfilzer. Second, I want to discuss local solubility of systems of r cubic forms, reducing the number of required variables to $O(r^2)$ from Schmidt's $O(r^3)$, over p-adic fields $\mathbb{Q}_p$ with $p \geq 5$.

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Romanoff type representations: history, results and unsolved problems

Yuchen Ding

Abstract. The well-known Romanoff theorem states that there is a positive proportion of odd numbers n which can be written as $p + 2^s$, where p is a prime and s is a natural number. There are a number of variants and generalizations involving Romanoff's theorem in the past decades. In this talk, I will introduce briefly the history, results and unsolved problems of Romanoff's representations.

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Using uniform distribution for arithmetic progressions in Euclidean Ramsey theory

Jakob Führer

In Euclidean Ramsey theory, we study which monochromatic structures are guaranteed to occur in any colouring of Euclidean space in a finite amount of colours. One of the earliest results in the area, due to Erdős et al., states that configurations that can not be avoided, independently of the dimension, have to be spherical, i.e. they fit on a sphere. Therefore, there is an interest in studying arithmetic progressions (APs) as the simplest non-spherical configurations.

In this talk, we discuss how it can be beneficial to view this problem as a colouring problem about polynomial equations and present two types of colourings that allow us to analyse APs using uniform distribution theory.

References: P. Erdős, R.L. Graham, P. Montgomery, B.L. Rothschild, J. Spencer and E.G. Straus, Euclidean ramsey theorems. I, Journal of Combinatorial Theory, Series A, 14 (3), 1973, 341-363.

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Selberg zeta functions have second moment at $\sigma = 1$

Ramūnas Garunkštis

We obtain the second moment for the Selberg zeta function for a Fuchsian group of the first kind at $\sigma = 1$. The prime geodesic theorem plays a crucial role in this context. The proof extends to Beurling zeta-functions satisfying a weak form of the Riemann hypothesis and to general Dirichlet series with positive coefficients, the partial sums of which are well-behaved. Note that by employing the recent approach of Broucke and Hilberdink [1] in proving the second moment theorem, we can circumvent the separation condition introduced by Landau for general Dirichlet series, which appear in P. Drungilas, R. Garunkštis, and A. Novikas [2].

Coauthor: Jokūbas Putrius

References:

[1] F. Broucke and T. Hilberdink. A mean value theorem for general Dirichlet series. Q. J. Math., 75(4), 2024, 1393–1413.

[2] P. Drungilas, R. Garunkštis, and A. Novikas. Second moment of the Beurling zeta-function. Lith. Math. J., 59(3), 2019, 317–337.

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Integral points of bounded height on a log Fano threefold

Anouk Greven

We outline how an adaptation of Heath-Brown's delta method (1996) to possibly skew boxes, together with techniques to count lattice-points, can be used to count integral points of bounded height on a specific log Fano threefold.

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Primes and Quadratic Polynomials

Lasse Grimmelt

Generalising a famous conjecture of Landau, we expect that for any fixed positive integer h there should be infinitely many prime values of the quadratic polynomial $n^2 + h$. Two cornerstones of modern analytic number theory naturally appear when studying this problem: Combinatorial decompositions and the spectral theory of automorphic forms. Based on an improved way of applying spectral methods, we recently improved the size of the largest prime divisor of these quadratic polynomials and in upcoming work, consider the problem on average of h.

References:

[1] L. Grimmelt, J. Merikoski: On the greatest prime factor and uniform equidistribution of quadratic polynomials. ArXiv preprint 2505.00493
[2] L. Grimmelt, J. Merikoski, M. Pandey: On primes and the Möbius function over quadratic polynomials. Manuscript in preparation

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On Discrete Moments of Weyl Sums and Polynomial Large Sieve Inequalities

Karin Halupczok

We seek good upper bounds for the sum $S = \sum_{a\le T} \left| \sum_{m\le x} e(azP(m)) \right|$ with parameters $T, x, z, k, q \ge 1$, where $P(X) = \alpha_k X^k + \cdots + \alpha_1 X$ is any polynomial of degree k with vanishing constant term such that the leading term α_k admits a good rational approximation with denominator q in the sense of Dirichlet's approximation theorem. In the talk, the statements of some results are given, and a short discussion of further development in the literature. Two applications are mentioned: bounding the number of integer points close to the graph of a smooth function, and improvements to the polynomial large sieve inequality. Concerning the last-mentioned application, we discuss also more recent results in the multivariate case.

References:

K. Halupczok, Bounds for discrete moments of Weyl sums and applications, Acta Arith. 194 (2020), no. 1, 1–28.

K. Halupczok, M. Munsch: Large Sieve Estimate for Multivariate Polynomial Moduli and Applications, Monatsh. Math. 197, 463–478 (2022).

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Zeros of Poincaré series

Noam Kimmel

We explore the zeros of certain Poincaré series $P(k, m)$ of weight k and index m for the full modular group. These are distinguished modular forms, which have played a key role in the analytic theory of modular forms. We study the zeros of $P(k, m)$ when the weight k tends to infinity. The case where the index m is constant was considered by Rankin who showed that in this case almost all of the zeros lie on the unit arc $|z| = 1$. In this talk we will explore the location of the zeros when the index m grows with the weight k, finding a range of different limit laws. Along the way, we also establish a version of Quantum Unique Ergodicity for some ranges.

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Limiting distribution of elliptic sums

Paolo Minelli (TU-Graz)

We study elliptic Dedekind sums, introduced by R. Sczech as generalizations of classical Dedekind sums to complex lattices. We determine their limiting distribution and establish bounds for their first moment, confirming a conjecture raised by Ito's numerical investigation.

This is joint ongoing work with Matteo Bordignon.

Uniform diophantine approximation with restricted denominators

Marc Munsch (Université de St-Etienne, ICJ)

In this talk, we will consider the metric question of uniform Diophantine approximation of real numbers with denominators coming from a sequence $(a_n)_{n\in\mathbb{N}}$. In the simplest case where $a_n = n$, this is the classical setting of Dirichlet's theorem. We will consider the general case and give several results ensuring the existence of good approximations for almost all reals. As an application, we will consider the problem of small gaps in the sequence $(a_n\alpha)_{n\in\mathbb{N}}$ improving previous results in the literature. A new problem about GCD sums will play a key role in the proof.

This is joint work with Manuel Hauke (TU Graz).

Statistics of the Hasse norm principle

Rachel Newton

Let L/K be an extension of number fields. The norm map $N_{L/K} : L^{\times} - > K^{\times}$ extends to a norm map from the ideles of L to those of K. The Hasse norm principle is said to hold for L/K if, for elements of $K^{\times}$, being in the image of the idelic norm map is equivalent to being the norm of an element of $L^{\times}$. I will survey some recent work studying the frequency of failure of the Hasse norm principle in families of number fields.

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Density Properties of Fractions with Euler's Totient Function

Marvin Ohst

We explore how classical results of Schinzel and Sierpiński on the closure of the range of $\varphi(n)/n$ and $\varphi(n+1)/\varphi(n)$ can be generalized to arithmetic progressions.

Coauthor: Karin Halupczok

References:

1) A. Schinzel and W. Sierpiński, "Sur quelques propriétés des fonctions $\varphi(n)$ et $\sigma(n)$.", Bull. Acad. Polon. Sci. Cl. III. 2 (1954), 463–466.
2) A. Schinzel, "Generalisation of a theorem of B.S.K.R. Somayajulu on the Euler's function $\varphi(n)$", Gaṇita 5 (1954), 123-128.
3) K. Halupczok and M. Ohst, "Density properties of fractions with Euler's totient function", (to appear in) Involve, a Journal of Mathematics.

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Some problems about arithmetic progressions

Péter Pál Pach

In this talk we discuss bounds for the size of sets avoiding arithmetic progressions and other arithmetic or geometric configurations in $\mathbb{F}_p^n$ (or more generally, in $\mathbb{Z}_m^n$). We also mention some open questions, including problems about arithmetic progressions connected to the Alon–Jaeger–Tarsi conjecture.

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Mean values of the Riemann zeta function at shifted zeros under the Riemann Hypothesis

Julija Paliulionytė

Assuming the Riemann hypothesis, we obtain asymptotic formulas for $\sum_{0<\gamma<T} \zeta(\rho+\delta)\zeta(1-\rho+\overline{\delta})$ in the region $-\frac{a}{\log T} \leq \Re\delta \leq \frac{1}{2}+\frac{a}{\log T}$, $|\Im\delta| \ll 1$. Unconditionally, this asymptotic formula was recently obtained by Garunkštis and Novikas in essentially the same region, with a slight incompleteness. Assuming RH, we obtain a sharper error term.

Coauthors: Ramūnas Garunkštis

References:

R. Garunkštis and A. Novikas, Discrete mean value theorems for the Riemann zeta-function over its shifted nontrivial zeros, Functiones et Approximatio Commentarii Mathematici 72 (2), 2025, 201–224.

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Bilinear forms with Kloosterman sums via non-abelian amplification

Alex Pascadi

We introduce a new approach to bound bilinear (Type II) sums of Kloosterman sums with composite moduli; combining this with previous results for prime moduli, we achieve savings beyond the Pólya–Vinogradov range for all moduli. We use Fourier analysis on $\mathrm{SL}_2(\mathbb{Z}/c\mathbb{Z})$, an amplification argument with non-abelian characters, and arrive at a counting problem. We briefly mention applications to moments of twisted cuspidal L-functions and to large sieve inequalities for exceptional cusp forms.

References:

A. Pascadi, *Non-abelian amplification and bilinear forms with Kloosterman sums*, preprint (2025), `arXiv:2511.08445`.

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Two-point correlations of bounded multiplicative functions

Cédric Pilatte

I will present recent work on strong quantitative bounds for pair correlations of multiplicative functions, based on the theory of non-backtracking matrices. When applied to Chowla's conjecture, this approach yields the estimate $\frac{1}{x}\sum_{n\le x}\lambda(n)\lambda(n+1) \ll (\log x)^{-c}$ for "almost all" scales x.

References: H.A. Helfgott and M. Radziwiłł, Expansion, divisibility and parity. preprint arXiv:2103.06853, 2021.

C. Pilatte, Improved bounds for the two-point logarithmic Chowla conjecture. preprint arXiv:2310.19357v2, 2025.

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On the frequency of small gaps between primes

Janos Pintz

In recent work Friedlander studied the problem of how large consecutive primegaps should be in order that the sum of the reciprocals should be divergent. Supposing a very deep Hypothesis, a generalization of the Hardy-Littlewood prime k-tuple conjecture, he gave an almost presize answer for it. In the present work we give an unconditional answer for a much weaker form of the same problem.

S-squareful values of binary quadratic forms

Sarah Sophie Pohl

In this talk we build on work of Alec Shute on the leading constant in the Manin-type conjecture for Campana points, more precisely on his work on squareful values of binary quadratic form. Shute observes that these examples of Campana points do not satisfy a Manin-type conjecture that has been formulated by Pieropan, Smeets, Tanimoto and Varilly-Alvarado (PSTVA conjecture). In his work he raises the question what happens if one considers S-integers instead. We discuss this question and show that we still find counterexamples to the PSTVA conjecture in this more general setting.

References: A. Shute. On the leading constant in the Manin-type conjecture for Campana points. *Acta Arithmetica*, 204:317-346, 2022.

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Consecutive cubic fields with large class numbers

Om Prakash

The folklore Gauss conjecture predicts infinitely many real quadratic fields of class number 1. From this perspective, it is striking that one can find arbitrarily long sequences of consecutive real quadratic fields whose class numbers are essentially as large as possible. Recent work of Cherubini, Fazzari, Granville, Kala, and Yatsyna shows the existence of such sequences.

In this talk, I will consider cubic number fields ordered by their discriminants, and show that there exist arbitrarily long sequences that contain only fields with class numbers greater than a given bound.

Coauthor: Vítězslav Kala

References: V. Kala, O. Prakash, There are consecutive cubic fields with large class numbers, when ordered by discriminant, arXiv.

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On the structure of infinite sumsets in the integers

Florian K. Richter

A long-standing open problem in combinatorial number theory, posed by Erdős and Graham, asks for a classification of all integer subsets $A, B \subset \mathbb{N}$ for which $d(A+B) = d(A) + d(B)$, where $d(.)$ denotes the natural density in the integers. We will discuss the history and motivation of this problem, as well as recent progress toward its resolution.

Coauthors: Ethan Ackelsberg

References: Erdős, P. and Graham, R., Old and new problems and results in combinatorial number theory. Monographies de L'Enseignement Mathematique (1980).

Additive properties of convex sets

Oliver Roche-Newton

A finite set $A \subset \mathbb{R}$ is said to be *convex* if its consecutive differences are strictly increasing. That is, labelling the elements of A so that $a_1 < a_2 < \cdots < a_n$, we have that

$$a_i - a_{i-1} < a_{i+1} - a_i$$

holds for all $2 \leq i \leq n - 1$. One expects that convex sets cannot be too additively structured, and there are various different problems which give different ways to quantity this belief. Perhaps the most well-known such problem is the conjecture of Erdős which states that the sum set of a convex set must have cardinality close to the maximum possible size.

In this talk, I will discuss some other additive questions concerning convex sets. The central question of the talk is the following: how many three-term arithmetic progressions can a convex set have? Some partial answers to this and closely related problems will be given.

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Almost-prime solutions to systems of cubic equations

Simon L. Rydin Myerson

I discuss a proof that any system of t homogeneous cubic equations with integral coefficients in $400,000t^4$ variables has almost-prime solutions, provided that we either allow some variables to vanish or apply a generic linear transformation. This gives an almost-prime analogue of a result due to Dietmann. For pairs of homogeneous equations we also examine the number of variables required to guarantee the Zariski density of the almost-prime solutions in the rational solutions. We use a slight refinement of a sieve due to Schindler and Sofos.

References:

J. Brüdern, R. Dietmann, J. Y. Liu, and T. D. Wooley, A Birch-Goldbach theorem, Archiv der Mathematik, 2010, 94(1):53–58.

R. Dietmann, On the h-invariant of cubic forms, and systems of cubic forms, The Quarterly Journal of Mathematics, 2017, 68(2):485–501.

D. Schindler and E. Sofos, Sarnak's saturation problem for complete intersections, Mathematika, 2019, 65(1):1–56.

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Complete sets of powers

Jan-Christoph Schlage-Puchta

A sequence (a_n) of integers is called complete, if every sufficiently large integer is the sum of some subsequence. Fix a finite set of integers $d_1, \dots, d_k$ and an integer s, and put $\mathcal{D} = \{d_i^n : 1 \leq i \leq k, n \geq s\}$. Burr, Erdős, Graham, and Li conjectured that $\mathcal{D}$ is complete if and only if $(d_1, \dots, d_k) = 1$ and $\sum \frac{1}{d_i - 1} \geq 1$. We show that the conjecture holds if $\sum \frac{1}{d_i - 1} \geq C$, where C depends on the amount of computational resources we are willing to invest. $C = 4$ is quite easy, for fixed s we can reach $C = 2 + \epsilon$ with a finite amount of computation. The proof combines combinatorial arguments with the circle method. The fact that even in special cases we cannot obtain $C = 2$ reflects the fact that binary problems are usually out of the reach of the circle method.

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Prime functions and the extended Selberg class

Raivydas Šimėnas

The concept of primeness has been defined for meromorphic functions, namely, a meromorphic function $F(s)$ is prime if and only if for every decomposition $F(s) = f(h(s))$ with f and h meromorphic, either f or h must be a fractional linear transformation. Primeness was first proved for the function $e^s + s$. Later, this property was shown for the Riemann zeta function and the Gamma function. I discuss primeness in the context of the extended Selberg class.

References: R. Garunkštis, T. Panavas, and R. Šimėnas, Decompositions of the extended Selberg class functions, Open Math. 23(1), 2025.

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The Landau-Selberg-Delange method for Dirichlet L-functions, and applications

Akash Singha Roy

The Landau-Selberg-Delange "LSD" method gives precise asymptotic formulas for the partial sums $\sum_{n\le x} a_n$ of a Dirichlet series $\sum_n a_n/n^s$ that behaves like a complex power of the Riemann zeta function. However, situations often arise when the Dirichlet series behaves like (a product of) complex powers of Dirichlet L-functions to a modulus q. In such situations, one often requires sharp asymptotics for the partial sums $\sum_{n\le x} a_n$ that apply in really wide ranges of q, much wider than permitted by existing forms (or known extensions) of the LSD method. In this talk, we address this problem, obtaining asymptotic series estimates for $\sum_{n\le x} a_n$ that hold true for q varying in these substantially wider ranges. Our results also lead to a variety of new applications that were not accessible with previous literature on mean values of multiplicative functions.

1. A. Singha Roy, "The Landau-Selberg-Delange method for products of Dirichlet L-functions, and applications, I", Submitted.
Recent version: https://akashsingharoy.github.io/LFunctionsLSD.pdf

2. A. Singha Roy, "Joint distribution in residue classes of families of multiplicative functions I", Submitted.
Recent version: https://akashsingharoy.github.io/JtMultEqd1.pdf

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Moments of the Siegel Transform in Function Fields and Effective Density of Quadratic Form

Noy Soffer Aranov

Oppenheim conjectured that every non-degenerate indefinite irrational quadratic form $Q : \mathbb{R}^n \to \mathbb{R}$ satisfies $\overline{Q(\mathbb{Z}^n)} = \mathbb{R}$. Oppenheim's conjecture was eventually proved by Margulis, and later Ratner through homogeneous dynamics and measure rigidity. An interesting question pertains to the rate at which $Q(\mathbb{Z}^n)$ becomes dense, and there have been many works in this direction, such as Eskin-Margulis-Mozes, Athreya-Margulis, Ghosh-Kelmer-Yu and Kelmer-Yu. Surprisingly, in the function field setting, Oppenheim's conjecture holds due to a result from Amir Mohammadi's thesis, despite the fact that Ratner's orbit closure theorem in this setting is still wide open.

In this talk, we discuss ongoing work on effective density of quadratic forms defined over function fields in odd positive characteristic. To obtain our results on effective density, we compute the moments of the Siegel transform, establish a function field analogue of Rogers' second moment formula, and apply it to obtain bounds on the discrepancy between the number of lattice points in a set and the expected value obtained through basic counting heuristics. Furthermore, we obtain an exact formula for the error term in the second moment formula for indicators of balls, whereas in the real setting, such a formula does not exist.

Coauthors: Jiyoung Han (Pusan National University).

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Large Values of Dirichlet Character Sums and L-Functions

Yutong Song

In recent years, the study of Omega results for the Riemann zeta function and L-functions has attracted considerable attention, with influential contributions by Soundararajan and Aistleitner.In this talk, we discuss large values of Dirichlet character sums with multiplicative coefficients and conditional large values of quadratic Dirichlet L-functions near s = 1/2.

Coauthors: Zikang Dong, Zhonghua Li and Shengbo Zhao. References:
C. Aistleitner, Lower bounds for the maximum of the Riemann zeta function along vertical lines, Math. Ann., 365 (2016), pp. 473–496.
K. Soundararajan, Extreme values of zeta and L-functions, Math. Ann., 342 (2008), pp. 467–486.

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The large sieve inequality and additive decompositions of sums of squares

Julia Stadlmann

Ostmann's problem asks if there are sets $A_1, A_2 \subseteq \mathbb{Z}$ with $|A_1|, |A_2| > 1$ so that the sumset $A_1 + A_2$ differs from the set of primes by only finitely many elements. While it is believed that no such pair A_1 and A_2 exists, the strongest known result [1] tells us that any such A_1, A_2 would have to satisfy

$$\sqrt{x}/(\log x \log\log x) \ll |A_i \cap [1,x]| \ll \sqrt{x} \log\log x \quad \text{for } i \in \{1,2\}.$$

The main obstacle to improving these bounds, which is related to the inverse large sieve problem [2], occurs when A_1 and A_2 each occupy approximately half the residue classes mod p for each prime p. This barrier motivates us to study additive decompositions of the set of sums of two squares: Unlike the primes, sums of two squares clearly can be decomposed as a sumset $S + S$ with $S = \{n^2 : n \in \mathbb{Z}\}$, and the set S indeed occupies about half the residue classes mod p. If $|B_1|, |B_2| > 1$ with $B_1 + B_2 = S + S$, then what can we say about $|B_1|$ and $|B_2|$? While there are uncountably many pairs B_1 and B_2 with these properties, we find that $|B_i \cap [1,x]|$ again has to be close to $\sqrt{x}$:

In this talk, I will discuss how Selberg's sieve, Montgomery's large sieve and Gallagher's larger sieve can be combined to give estimates on the size of the components of a sumset decomposition of $S + S$, and how these arguments differ from the case of primes. In particular, I will highlight how careful manipulations of the large sieve inequality allow us to improve on the Johnsen-Selberg sieve for certain interesting residue class configurations modulo prime squares.

Coauthors: Christian Elsholtz

References: [1] Elsholtz, C., and Harper, A. Additive decompositions of sets with restricted prime factors. TAMS 367, 10 (2015), 7403–7427.

[2] Green, B., and Harper, A. Inverse questions for the large sieve. Geometric and Functional Analysis 24 (2014), 1167–1203.

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Prime numbers with an almost prime reverse II

Cathy Swaenepoel

In a given base $b \geq 2$, the reverse of a positive integer n is the integer obtained by reversing the order of its digits. In a joint work with Cécile Dartyge and Joël Rivat, we prove that there are infinitely many prime numbers whose reverse in base b is almost prime. In the proof, the discrete Fourier transform of $n \mapsto \exp(2\pi i \alpha R_\lambda(n))$ ($\alpha \in \mathbb{R}$), where $R_\lambda(n)$ denotes the reverse of the λ first digits of n, plays a crucial role to estimate the type I and type II sums associated to our situation. In this talk, we will present some of the key ideas and ingredients that permit us to obtain strong bounds on this Fourier transform (including bounds in L^1 and L^∞ norm) and exploit them to estimate the type I and type II sums.

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Quantitative bouds for patterns involving primes

Joni Teräväinen

We discuss new density bounds for sets of primes lacking arithmetic progresisons (the Green–Tao theorem), and for sets of intgers lacking polynomial progressions with shifted prime difference (an extension of the Bergelson–Leibman theorem). These proofs involve quantive strengthenings of the dense model theorem and arithmetic regularity lemmas in additive combinatorics. This is based on joint works with Mengdi Wang and Ben Krause, Hamed Mousavi and Terence Tao.

Your address

Diagonal forms on hypersurfaces of adjacent degree

Anna Theorin Johansson

This talk discusses the Hasse principle for Diophantine systems consisting of one diagonal form of degree k and one general form of degree $k-1$. By refining the work of Brandes and Parsell in this specific adjacent-degree setting, the condition $n > 2^k k$ can be replaced by $n > 2^{k-1}(2k-1)$. In particular, for the classical case of a diagonal cubic and a quadratic form, the threshold improves from $n > 24$ to $n > 20$.

References: J. Brandes and S. T. Parsell, "The Hasse principle for diagonal forms restricted to lower-degree hypersurfaces", Algebra & Number Theory 15.9, 2021, pp. 2289–2314.

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The density of elliptic curves over $\mathbb{Q}_p$ with a rational 3-torsion point or a rational 3-isogeny

Matteo Verzobio

We determine the probability that a random Weierstrass equation with coefficients in the p-adic integers defines an elliptic curve with a non-trivial 3-torsion point, or with a degree 3 isogeny, defined over the field of p-adic numbers. This is joint work with Stevan Gajović and Lazar Radicevic.

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Balanced rectangles of Sturmian words

Ingrid Vukusic

We will stare at an infinite matrix filled with 0's and 1's (more specifically, the Hankel matrix corresponding to a Sturmian word), and find out which rectangles are balanced! (For fixed m, n we say that the $m \times n$ rectangles are balanced if they all contain essentially the same number of 1s.) The answer will be closely related to the distribution of $n\alpha$ mod 1 and intervals of minimal discrepancy.

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Green–Tao theorem in sparse primes

Mengdi Wang

In this talk, I will introduce a new quantitative dense model that improves the bounds of Gowers (2010) and Reingold et al. (2008). I will then discuss potential applications of this dense model to arithmetic questions, such as refining quantitative bounds in the Green–Tao theorem for primes. This is based on joint work with Joni Teräväinen.

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Integral Diophantine approximation on varieties

Florian Wilsch

We study the local behavior of integral points on non-proper varieties, measuring how well they can approximate a fixed rational point on the boundary inside a compactification. Based on McKinnon's conjecture on the analogous problem for rational points and Siegel's Theorem, we develop an expectation that best approximations lie on rational curves with at most two intersection points with the boundary; we verify this for a class of toric varieties.

This is joint work with Zhizhong Huang.

Almost Sure Bounds for Discrepancies of Irrational Toral Translations

Hao Wu

The orbits of irrational rotations are equidistributed on the circle, but a natural question concerns the size of the error term. This leads to the study of discrepancy functions. There are two main approaches to this problem. One, following Kesten (1960, *Ann. of Math.*), focuses on limit laws describing the average behaviour when the rotation is randomised. The other, initiated by Khintchine and further developed by Beck (1994, *Ann. of Math.*), investigates almost sure bounds for discrepancies associated with a generic but fixed rotation. In this talk, I will present several results in this latter direction concerning almost sure bounds. In particular, we obtain almost optimal upper bounds for the maximal discrepancy of toral translations relative to polygons, as well as for discrepancies of linear forms relative to intervals on the circle. These results extend Beck's work on maximal discrepancy for toral translations with respect to axis-aligned boxes to more general settings.

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The arithmetic of cyclic covers in many variables

Lena Wurzinger

Let $d \geq 3$ and $e \geq 2$. We derive an asymptotic formula for the number of solutions to

$$y^e = F(x)$$

in expanding boxes in the many-variables regime. We apply the circle method; in particular use a refinement of Birch's minor arc analysis due to Browning and Prendiville.

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On the average number of representations of an integer as a sum of polynomials computed at prime variables

Alessandro Zaccagnini

We study the average number of representations of an integer n as $n = \phi(n_1) + \cdots + \phi(n_j)$, for polynomials $\phi \in \mathbb{Z}[n]$ with $\partial\phi = k \geq 1$, $\mathrm{lead}(\phi) = 1$, $j \geq k$, where n_i is a prime power for each $i \in \{1, \ldots, j\}$. We extend the results of Languasco and Zaccagnini in [2], for $k = 3$ and $j = 4$, and of Cantarini, Gambini and Zaccagnini in [1], where they focused on monomials $\phi(n) = n^k$, $k \geq 2$ and $j = k, k + 1$.

Coauthors: Alessandra Migliaccio

[1] M. Cantarini, A. Gambini, and A. Zaccagnini. "On the average number of representations of an integer as a sum of like prime powers". In: Proc. Amer. Math. Soc. 148 (2020), pp. 1499–1508.

[2] A. Languasco and A. Zaccagnini. "Sums of four prime cubes in short intervals". In: Acta Math. Hungar. 159.1 (2019), pp. 150–163.

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