Motivic Mellin transforms and exponential sums through non-archimedean geometry

Fact Sheet

Project Information

MOTMELSUM

Grant agreement ID: 615722

Project closed

Start date
1 March 2014

End date
28 February 2019

Funded under
Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Total cost
€ 912 000,00

EU contribution
€ 912 000,00

Coordinated by
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS
France

Objective

"We aim to create a new and powerful theory of motivic integration which incorporates Mellin transforms. The absence of motivic Mellin transforms is a major drawback of the existing theories. Classical Mellin transforms are in essence Fourier

transforms on the multiplicative group of local fields. We aim to apply this theory to study new motivic Poisson summation formulas, new transfer principles, and applications of these. All of this has so far only been studied in the presence of additive characters, and remains completely open for multiplicative characters. Understanding all this at a motivic level yields a uniform understanding when the local field varies and will require an approach using non-archimedean geometry. We will open up possibilities for applications via new transfer principles and will give access to motivic Poisson formulas of other groups than the additive group. For these applications it is important that Fubini Theorems are present at the level of the motivic integrals, which we aim to develop. We will overcome the major obstacle of the totally different nature of the dual group of the multiplicative group by a proposed sequence of germs of ideas by the author. The importance of our work on motivic Fourier transforms on the additive group is already widely recognized, and this proposal will complement it by exploring the new territory of motivic multiplicative characters. A final topic is the study of the highly non-understood exponential sums modulo powers of primes, in relation with Igusa's foundational work. We will try to discover a deeper understanding of the uniform behavior of these sums when the prime number varies. These sums are linked to geometrical concepts like the log-canonical threshold, and also to Poisson summation, after the work by Igusa. We will aim to prove a highly generalized form of Igusa's conjecture on exponential sums."

Fields of science (EuroSciVoc)

natural sciences > mathematics > pure mathematics > **geometry**

natural sciences > mathematics > pure mathematics > arithmetics > **prime numbers**

Programme(s)

FP7-IDEAS-ERC - Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Topic(s)

ERC-CG-2013-PE1 - ERC Consolidator Grant - Mathematics

Call for proposal

ERC-2013-CoG
See other projects for this call

Funding Scheme

ERC-CG - ERC Consolidator Grants

Host institution

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

EU contribution

€ 912 000,00

Total cost

No data

Address

RUE MICHEL ANGE 3
75794 Paris
France

Region

Ile-de-France > Ile-de-France > Hauts-de-Seine

Activity type

Research Organisations

Principal investigator

Raf Cluckers (Prof.)

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Beneficiaries (1)

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS

France

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