



Berlin  
Mathematical  
School

## BMS Kovalevskaya Colloquium

Friday 11 December 2015 at 14:15

*Tea & Cookies starting at 13:00*

BMS Loft, Urania, An der Urania 17, 10787 Berlin

### Julia Wolf

*(U Bristol)*

#### Quadratic Fourier Analysis

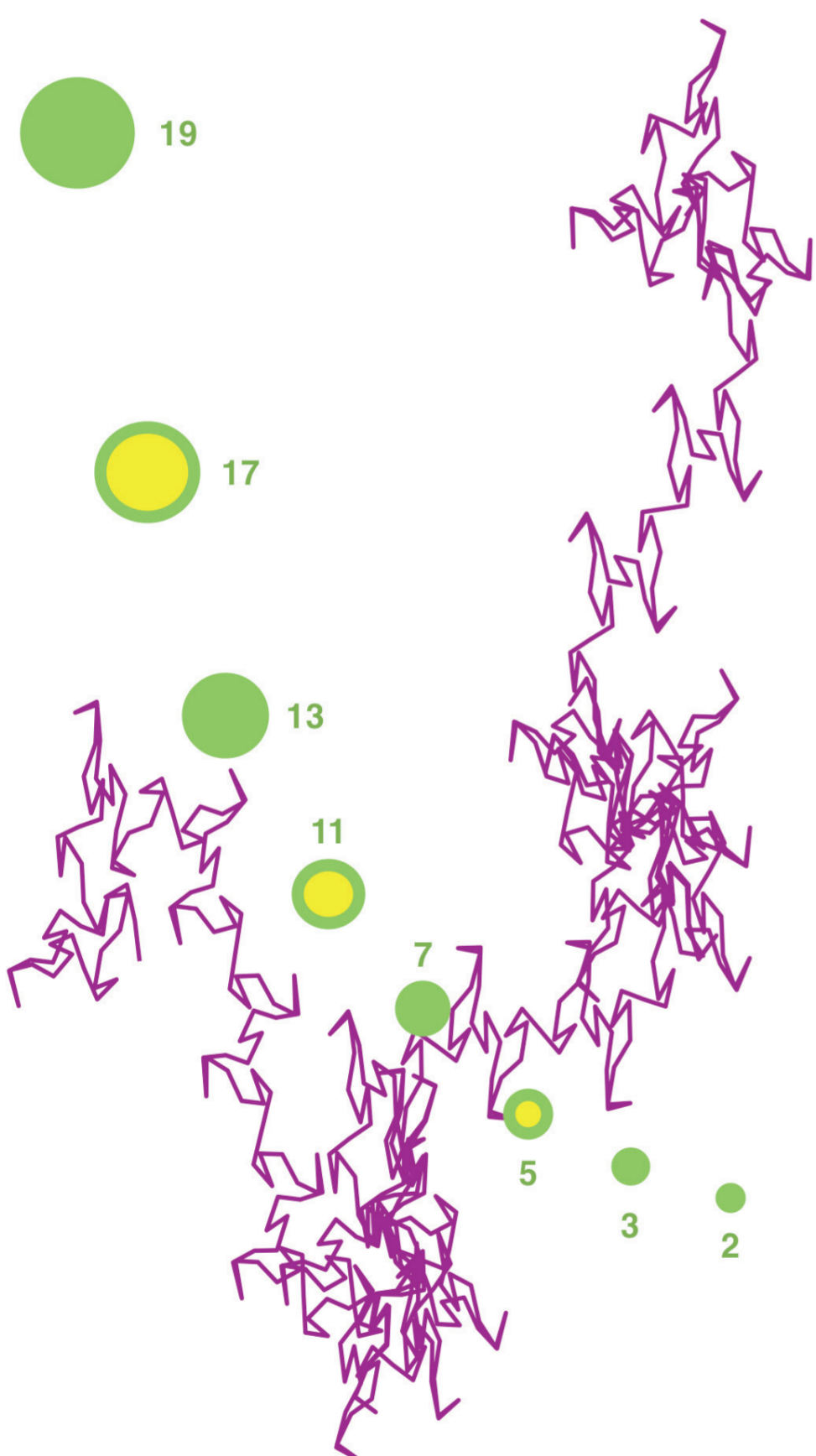
Quadratic Fourier analysis has its origins in quantitative approaches to Szemerédi's theorem, which states that any sufficiently dense subset of the first  $N$  integers contains a  $k$ -term arithmetic progression. It has also found numerous other applications to long-standing problems in combinatorics, number theory, analysis, and theoretical computer science.

In applications of classical Fourier analysis, we often decompose a function into a structured part given by the frequencies supporting large Fourier coefficients, plus an error term that we hope will be negligible. In certain applications, however, the small Fourier coefficients cannot be ignored.

Quadratic Fourier analysis yields decompositions with a suitably negligible error term. Unfortunately, the structured part of the function can no longer be expressed as a simple linear combination of linear exponentials. However, input from additive combinatorics allows one to infer that it has quadratic structure.

This talk will be an introduction to this fascinating subject and aims to highlight some recent applications and open problems.

Julia Wolf obtained her BA and PhD degrees in mathematics from the University of Cambridge. She subsequently spent three years in the United States with postdoctoral fellowships at Princeton and Berkeley, and an assistant professorship at Rutgers University. Between 2010 and 2013, she held a Hadamard Associate Professorship at École Polytechnique in Paris, where she completed her habilitation, and was invited to speak in the prestigious Bourbaki seminar. She currently holds a readership at the University of Bristol and is the Associate Chair of the Heilbronn Institute for Mathematical Research.



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