CHAO LI WINS THE 2024 DAVID GOSS PRIZE

The third David Goss Prize in Number Theory is awarded to Chao Li (Columbia University, USA) at the JNT biennial conference in Cetraro, Italy on August 23, 2024. The David Goss Prize (10K USD) is awarded every two years to mathematicians under the age of 35 for outstanding contributions to number theory. The prize is dedicated to the memory of David Goss who was the former editor in chief of the Journal of Number Theory.

CHAO LI has made very impressive contributions to arithmetic geometry. His work touches a wide range of topics such as special cycles on both Shimura varieties and Rapoport–Zink spaces, and the Beilinson–Bloch conjecture. In the following, we describe the contents of some of these results briefly.

A first significant achievement of Chao Li is his proof of the arithmetic Siegel–Weil formula, in collaboration with Wei Zhang. This is a highly influential program initiated by Kudla, aiming to relate the central derivative of certain Siegel Eisenstein series to the arithmetic intersection number of n special divisors on Shimura varieties, either associated with GU(n - 1, 1) or with GSpin(n - 1, 2). The special cases for small n and the archimedean part were previously established. Chao Li and Wei Zhang proved the (non-degenerate part of) arithmetic Siegel–Weil formula for all n. In the unitary case, this was a conjecture formulated by Kudla and Rapoport. In the orthogonal case, they formulated and proved an analogue on the GSpin Rapoport–Zink spaces.

Another brilliant contribution of Chao Li to arithmetic geometry is on the Beilinson– Bloch conjecture for unitary Shimura varieties, joint with Yifeng Liu. The general Beilinsin–Bloch conjecture is a natural generalization of the famous Birch and Swinnerton– Dyer conjecture to high dimensions, relating zeros of *L*-functions to algebraic cycles with trivial cohomology classes. Chao Li and Yifeng Liu's work focuses on the case where the analytic rank is 1 and they first proved an arithmetic inner product formula; for modular curves this is essentially the Gross–Zagier theorem. They proved the result for the middle cohomology for all unitary Shimura varieties when the automorphic representation (tempered cuspidal) satisfies mild local assumptions.

The members of the 2024 Prize committee were: Ziyang Gao (Leibniz University Hannover, Germany / UCLA, USA), Dorian Goldfeld (Columbia University, USA), Philippe Michel (École Polytechnic Lausanne, Switzerland), Emmanuel Ullmo (IHES, France), Umberto Zannier (Scuola Normale, Italy), Shou-Wu Zhang (Princeton University, USA).