ALEXANDER SMITH WINS THE 2019 DAVID GOSS PRIZE

The first David Goss Prize in Number Theory was awarded to Alexander Smith at the JNT Biennial conference in Cetraro Italy on July 24, 2019. The newly-established David Goss Prize (10K USD) will be awarded every two years to a mathematician 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.

Alexander Smith has made very impressive contributions to number theory and arithmetic geometry. His work touches a wide range of topics such as the Selmer groups of elliptic curves, the class groups of imaginary quadratic fields, the congruent number problems, and the Birch and Swinnerton-Dyer (BSD) conjecture.

Alexander Smith's amazing research achievements began with his undergraduate senior thesis at Princeton University written under the supervision of Shou-Wu Zhang. A congruent number is a positive integer which is the area of a right triangle all of whose sides have rational number length. In his thesis, Smith proved that at least 55.9 percent of all square-free numbers $n \equiv 5, 6, 7 \pmod 8$ are congruent numbers [arXiv:1603.08479]. This was the first positive density result obtained for the congruent number problem. The problem of determining which numbers are congruent goes back to antiquity. Smith's proof was based on the study of 2-Selmer groups of the congruent number elliptic curves following previous work of Heath-Brown-Monsky and Tian-Yuan-Zhang.

Recently, in a manuscript that appeared in [arXiv:1702.02325], he went way beyond his senior thesis by studying the 2^∞-Selmer groups of all elliptic curves with full 2-torsion. He proved that the 2^∞-rank is distributed according to the Delaunay heuristic. Under the BSD conjecture, Smith's result implies the famous Goldfeld conjecture for the distribution of analytic ranks of quadratic twists of such elliptic curves. As a byproduct, Smith also proved that the 2^∞-rank of the class groups of imaginary quadratic fields are distributed according to the classical Cohen-Lanstra heuristic.

Alaxander Smith was born in the US in 1993, received his BA from Princeton University in 2015. He is expected to receive his Ph.D. from Harvard University in 2020 under the direction of Noam Elkies. Besides the two preprints mentioned as above, he has two published papers written when he was an undergraduate at Princeton.

The members of the 2019 Prize committe were: Dorian Goldfeld (*Columbia University, USA*), Philippe Michel (*École Polytechnic Lausanne, Switzerland*), Dipendra Prasad (*Tata Institue, India*), Emmanuel Ullmo (*IHES, France*), Umberto Zannier (*Scuola Normale, Italy*), Shou-Wu Zhang (*Princeton University, USA*).