Mathematics Colloquium

The interplay of algebra and analysis in arithmetic geometry

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Friday, May 19, 2023
11:10 am − 12 pm
Building 180, Room 102

Abstract

Before Andrew Wiles announced his proof of Fermat's last theorem, the best results towards a proof involved studying if the ring $\mathbb{Z}[\zeta_p]$ has unique factorization. However, the problem of determining if such a ring has unique factorization is a very difficult problem! In this talk we will show how far $\mathbb{Z}[\zeta_p]$ is away from having unique factorization ties into special values of the Riemann zeta function. From here, we'll fit this result into an overall theme in arithmetic geometry that says certain complex analytic functions known as L-functions should give subtle arithmetic information about interesting number theoretic objects that are "geometric" in some sense. In addition to framing the result about unique factorization in this language, we'll show how the same language applies to elliptic curves as well.

About the speaker: Jim received his PhD from the University of Michigan in 2005 under the guidance of Chris Skinner. He held the positions as a VIGRE Arnold Ross Assistant Professor at the Ohio State University and the Olga Taussky - John Todd Instructor of Mathematics at Caltech, before moving to Clemson University where he was a faculty member for 10 years. He was the Gorenstein Visiting Associate Professor of Mathematics at CUNY - Queens College in 2015-16. He relocated from Clemson University to Occidental College in 2018 to become chair of the Department of Mathematics. He is currently a professor at Occidental College.