Levi L. Conant 2017 LECTURE SERIES

David H. Bailey

Lawrence Berkeley National Laboratory (retired)
University of California, Davis, Computer Science

WPI Department of Mathematical Sciences

Friday, Sept. 15, 4pm
Location TBD

Computation and analysis of arbitrary digits of Pi and other mathematical constants

We recently performed some very large mathematical calculations, uncovering digits of various mathematical constants that until quite recently were widely considered to be forever inaccessible to humans. Our computations stem from the "BBP" formula for Pi, which was discovered in 1997 using a computer program implementing the "PSLQ" integer relation algorithm. This formula has the remarkable property that it permits one to directly calculate binary or base-16 digits of Pi, beginning at an arbitrary position, without needing to calculate any of the preceding digits. Since 1997, numerous other BBP-type formulas have been discovered for various mathematical constants. In our Conant Prize article, we described the computation of base-64 (binary) digits of Pi^2, base-729 (ternary) digits of Pi^2, and base-4096 (binary) digits of Catalan's constant, in each case beginning at the ten trillionth place. The computation of base-16 digits of Pi beginning at the 500 trillionth place has previously been described by other researchers. We also discussed intriguing connections between these BBP formulas and the age-old unsolved research question of whether and why constants such as Pi have "random" digits.

GRAPHIC: Francisco J. Aragón Artacho, Ramón y Cajal Fellow, Department of Mathematics, University of Alicante, Spain

David H. Bailey received his PhD in mathematics from Stanford University in 1976 and in his subsequent career worked at the NASA Ames Research Center and then at the Lawrence Berkeley National Laboratory. He recently retired from the Berkeley Lab but continues as a research associate with the University of California, Davis, Department of Computer Science. His published work includes over two hundred papers in experimental mathematics, computational number theory, parallel computing, high-precision computing, fast Fourier transforms, and mathematical finance. • Among his honors, he has received the Chauvenet and Merten Hesse Prizes from the Mathematical Association of America, the Sidney Fernbach Award from the IEEE Computer Society, and the Gordon Bell Prize from the Association of Computing Machinery.

Levi Leonard Conant, 1857–1916, was a mathematician and educator who spent most of his career as a faculty member at Worcester Polytechnic Institute; he served as head of the Mathematics Department and as acting president from 1911 to 1913. An outstanding teacher, and an active scholar, published many articles in scientific journals and wrote four textbooks. His large bequest to the American Mathematical Society established the Levi L. Conant Prize, awarded annually to recognize the best expository paper published in either *Notices of the AMS* or *Bulletin of the AMS* in the previous five years.

wpi.edu/+Math/News/conant.html
facebook.com/WPIMath • twitter.com/WPIMath

Sponsored by the Department of Mathematical Sciences