Congress Commends UM-Led Math Team's Breakthrough E8 Calculation

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A major mathematical breakthrough by a team of 18 scientists, led by University of Maryland mathematician Jeffrey Adams, has been commended by Congress, one week after the work made international headlines when it was announced by the American Institute of Mathematics (AIM), one of the leading math institutes in the U.S.

On Tuesday, March 27, Rep. Jerry McNerney (D-Calif.) read a statement to Congress about the work, which involved mapping one of the largest and most complicated structures in mathematics. If written out on paper, the calculation describing this structure, known as E8, would cover an area the size of Manhattan. Maryland's partners on this project included MIT, Cornell University, University of Michigan and the University of Utah.

"E8 was discovered over a century ago, in 1887, and until now, no one thought the structure could ever be understood," said Adams, project leader and a professor in the Department of Mathematics at the University of Maryland. "This groundbreaking achievement is significant both as an advance in basic knowledge, as well as a major advance in the use of large scale computing to solve complicated mathematical problems. The mapping of E8 may well have unforeseen implications in mathematics and physics which won't be evident for years to come."

E8, (pronounced "E eight") is an example of a Lie (pronounced "Lee") group. Lie groups were invented by the 19th century Norwegian

mathematician Sophus Lie to study symmetry. Underlying any symmetrical object, such as a sphere, is a Lie group. Balls, cylinders or cones are familiar examples of symmetric three-dimensional objects. Mathematicians study symmetries in higher dimensions. In fact, E8 is the symmetries of a geometric object like a sphere, cylinder or cone, but this object is 57-dimensional. E8 is itself is 248-dimensional.

Rep. McNerney concluded in his statement, which was included in the Congressional Record: "The participants are to be commended for their work that has expanded the limits of human knowledge and brings hitherto unknown beauty and power to grace our human condition." McNerney, who has a Ph.D. in mathematics, represents the district that is home to the American Institute of Mathematics (AIM).

The E8 calculation is part of an ambitious project sponsored by AIM and the National Science Foundation, known as the Atlas of Lie Groups and Representations. The goal of the Atlas project is to determine the unitary representations of all the Lie groups (E8 is the largest of the exceptional Lie groups). This is one of the most important unsolved problems of mathematics. The E8 calculation is a major step, and suggest that the Atlas team is well on the way to solving this problem.

The Atlas team consists of 18 researchers from around the globe. The core group consists of Jeffrey Adams (University of Maryland), Dan Barbasch (Cornell), John Stembridge (University of Michigan), Peter Trapa (University of Utah) , Marc van Leeuwen (Poitiers), David Vogan (MIT), and (until his death in 2006) Fokko du Cloux (Lyon).

Source: University of Maryland

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