

MEDIA RELEASE

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Number's up for mathematical mission impossible

In conjunction with Lawrence Berkeley National Laboratory and IBM Australia, Newcastle's Laureate Professor Jon Borwein has conquered a calculation that was, until recently, widely thought to be forever beyond the realm of possibility. In particular, they calculated digits beginning at the ten trillionth position (in two different number bases) of the fundamental mathematical constant pi squared, which arises in geometry, physics and other mathematical analyses, as well as one other mathematical constant.

"This calculation was thought to be impossible. And a mathematical calculation of this scale has never been completed before. The computer time that went into this work was equivalent to the time that goes into creating a computer-generated movie, such as *Toy Story 3*," Professor Borwein said. The work would have taken roughly fifteen hundred years on a single CPU.

To achieve this result, Professor Borwein and his partners used the *BlueGene/P* computer system --- one model in a line of highly parallel machines that are among the most powerful computers in the world --- which is used for IBM's benchmarking tests and quality control.

"By combining human ingenuity with the awesome power of the *BlueGene/P* computer we came up with an algorithm that allows us to identify potential weaknesses in computer system hardware and software," he said.

"The scheme that we used enables one to compute digits of mathematical constants, including the square of the mathematical constant pi, without knowing any previous digits. It was like we stuck our hand deep into the mathematical universe and pulled out the exact data."

A world-renowned expert, Professor Borwein is a prominent public advocate for experimental mathematics – an approach where numerical computation is used to investigate mathematical objects and identify properties and patterns.

Professor Borwein is also an international expert on the number pi, the ratio of the circumference of a circle to its diameter, especially its computation.

The Australian Government's Excellence in Research Australia (ERA) rated Applied Mathematics at the University of Newcastle as the strongest in the country, receiving the only rating of 5, for this field. The rating reflects the University's efforts in this area with the appointment of world-leading researchers, such as Professor Borwein, and the establishment of the Priority Research Centre for Computer Assisted Research Mathematics and its Applications.

Further Details: <http://carma.newcastle.edu.au/jon/bbp-bluegene.pdf>

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