



# MACQUARIE UNIVERSITY

Department of Mathematics

StreetFest

<http://streetfest.maths.mq.edu.au>

As a part of the Conference in honour of Professor Street's sixtieth birthday, we are organising a public lecture by Professor John Baez, for a general audience of mathematicians and physicists. Admission is free.

**DATE:** Thursday 14 July 2005

**TIME:** 5pm

**PLACE:** E7B T2

**TITLE:** The Mysteries of Counting: Euler Characteristic Versus Homotopy Cardinality

**ABSTRACT:** We all know what it means for a set to have 6 elements, but what sort of thing has  $-1$  elements, or  $5/2$ ?

These questions have nice answers. The Euler characteristic of a space is a generalization of cardinality that admits negative integer values, while the homotopy cardinality is a generalization that admits positive real values. These concepts shed new light on basic mathematics. For example, the space of finite sets turns out to have homotopy cardinality  $e$ , and this explains the key properties of the exponential function. Euler characteristic and homotopy cardinality share many properties, but it's hard to tell if they are the same, because there are very few spaces for which both are well-defined. However, in many cases where one is well-defined, the other may be computed by dubious manipulations involving divergent series – and the two then agree! The challenge of unifying them remains open.

**SPEAKER:** John Baez is a mathematical physicist working on quantum gravity using the techniques of “higher-dimensional algebra”. A professor of mathematics at the University of California, Riverside, he enjoys answering physics questions on the sci.physics.research usenet newsgroup, and also writes a regular column entitled “This Week's Finds in Mathematical Physics”.

**DINNER:** The lecture will be followed by the Conference Dinner at the MGSM hotel on Macquarie University campus. Those who are interested to attend the dinner should contact Victoria Benning ([vbenning@maths.mq.edu.au](mailto:vbenning@maths.mq.edu.au)) before 30 June.