



Wednesday 24 May 2006

**Lectures will be held in the Hardy Room, De Morgan House,
Basement 57 Russell Square, London WC1B 4HS**

5:00pm – 5:45pm: “Symmetry and the Monster”

Professor Mark Ronan [University of Illinois, Chicago]

This talk will describe the quest to find a complete list of all finite simple groups. These groups, the basic building blocks for all finite groups, were instrumental in Galois’ work on the solvability of algebraic equations; and he himself discovered some important ones. More were exhibited in Jordan’s great treatise in 1870, and further families emerged from Lie’s work, as a result of the classification work by Killing and Cartan in the late nineteenth century. After the Second World War new families of simple groups were discovered, and there was enormous interest in finding a complete list. A way forward was found using work of Richard Brauer, and the great theorem of Walter Feit and John Thompson. They showed that every finite simple group whose order is not a prime number must contain elements of order 2, leading to some important subgroups that offered a method for completing the list. To cut a long story short, while Thompson was advancing these new methods, Zvonimir Janko, a Croatian mathematician working in Australia, surprised the world with a very strange exceptional group. This was the first exception since Émile Mathieu discovered five beautiful groups of permutations in the nineteenth century, and it really set the cat among the pigeons. Further new exceptions came thick and fast, and they were dubbed “sporadic groups”. The largest is called the Monster. This talk will explain how the Monster was discovered, and how it came to reveal strange connections between number theory and mathematical physics, sometimes called the moonshine connections.

5:45pm – 6:15pm: Break for Refreshments

6:15pm – 7:00pm: “The Monster and String Theory”

Dr Katrin Wendland [Warwick Mathematics Institute]

In physics, the concept of symmetry has always played a fundamental role. Has the Monster then made its appearance as some symmetry group in physics? The answer is yes, and this answer is connected to a famous success story of mutual interactions between mathematics and physics. While in mathematics the Monster owes much of its popularity to Conway/Norton’s “monstrous moonshine conjectures” relating this group to “modular” functions on the upper half plane, in physics the Monster occurred first as the automorphism group of a certain conformal quantum field theory (CFT), let us call it the Monster CFT. Richard Borcherds used the latter to prove the former and was awarded the Fields Medal for his proof of “monstrous moonshine” in 1989. Unfortunately, axiomatic mathematical approaches to CFT are tedious, and a detailed description of any CFT would go beyond the scope of this talk. However, CFTs arise naturally in string theory, and in the particular case of the Monster CFT much of its construction can be motivated by simple geometry. This is the approach taken in this talk, aiming to give an overview on the geometric construction and various aspects of the Monster CFT.

Julian Hunt
Michael O’Neill

Entrance is Free and Event Open to All

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