THE UNIVERSITY of York

Presentation address by Professor Sanju Velani on the occasion of the conferment of the honorary degree of Doctor of the University upon Professor Gregory Margulis on 14 July 2011

Vice-Chancellor,

It is a great honour and pleasure to present to you Gregory Margulis**,** Erastus L DeForest Professor of Mathematics at Yale University. One of the most gifted, creative and influential mathematicians today, he has made profound and far-reaching contributions to algebra, in particular to the theory of lattices. Moreover, and just as importantly, he realised that the progress he had made in algebra could be used to throw light, in a new and completely unexpected way, on other areas of mathematics, including dynamical systems, ergodic theory, representation theory, number theory, combinatorics and measure theory. Audaciously reformulated, his deep and seminal results could be and have been applied to a variety of outstanding mathematical problems. The reformulations are far from obvious and required insight and imagination.

Naturally his ideas and techniques have been extremely influential. Many mathematicians, including colleagues at York, have used his methods to attack and solve a whole range of problems in Diophantine approximation, a branch of number theory which is well represented at York, and which some of you graduating will have come into contact with. I mentioned Professor Margulis's contribution to 'lattices'. These are a lovely abstraction of the familiar (I hope) integers which lie at the heart of number theory. This connection between lattices and number theory is one of the reasons why Professor Margulis is here today. It is why it is appropriate that the University of York recognises his enormous, enriching and beautiful contributions to mathematics by the award of an honorary doctorate.

Professor Margulis is one of only seven mathematicians ever to be awarded both the Fields Medal and the Wolf Prize for Mathematics. This specific achievement is something I would like to draw special attention to. The Fields Medal is awarded every four years to mathematicians who are under the age of 40. It is in terms of prestige (but not financially) the Nobel Prize of Mathematics. When Professor Margulis was awarded the prize in 1978 he was still working in Moscow in what was then the Soviet Union. He was unable to collect his prize in person as the authorities would not allow him to travel to the award ceremony in Helsinki. The symbolism of his absence was noted at that ceremony: the Helsinki Accords were signed on 1 August 1975 in Finlandia Hall, the very building where he should have accepted his medal. The Accords were the outcome of the first Conference on Security and Cooperation in Europe with the aim of improving relations between the Communist bloc and the West.

In 2005 he was awarded the Wolf Prize for Mathematics, the citation noting his 'monumental contributions to algebra.' The American Mathematical Society has stated that the central part of his work which led to the award 'displays stunning technical virtuosity and originality, with both algebraic and analytic methods. The work has subsequently reshaped the ergodic theory of general group actions on manifolds.' In being recognised with this award, he joined an extremely distinguished group, which includes Paul Erdös, who is another Honorary Doctor of this University. He has also been awarded the Medal of the Collège de France, the Alexander von Humboldt Prize, and the Lobachevsky International Prize of the Russian Academy of Sciences. In addition, he is a member of the National Academy of Sciences and a Foreign Honorary Member of the American Academy of Arts and Sciences. He has also been awarded a number of honorary doctorates. I choose this abbreviated list of honours as I believe you will all want to graduate this year rather than next, and if I listed all his accomplishments and awards this would not be possible.

This level of sustained scholarly achievement, over a long career, is instructive at many levels. But one that is especially significant to mention, when so many of you are graduating and have the prospect of shaping your lives ahead of you, is that such accomplishments come from serious application over a number of years. An honorary doctorate conventionally represents an award which recognises not just a single moment of brilliance – though that may be part of what is honoured – but longer term endeavour too. The kind of personal success which might lead to such an award invariably includes situations of remarkable difficulty. The state intervention preventing Professor Margulis from collecting the Fields Medal in person shows this vividly. But what an honorary doctorate and its recipient also reflect, and in some ways represent, is also difficulty overcome and success achieved. So, in awarding such degrees we offer the recipients to you who are graduating as exemplars of what is possible, of the highest human endeavour and accomplishment. Regardless of whether or not you are experts in the areas of the disciplines from which our distinguished guests come from, you will all be able to recognise what they represent in these terms. I hope that the example of Professor Margulis will be one you will take with you into whatever you choose to do in the future.

Professor Margulis was born and educated in Moscow and did his undergraduate and postgraduate work at Moscow State University. In 1979 he spent three months at the University of Bonn, and followed this with a number of visits to the Max Planck Institute in Bonn, the Institut des Hautes Études Scientifiques and to the Collège de France, Harvard and the Institute of Advanced Study in Princeton. He took up his Chair at Yale in 1991. His work has been profoundly influential in number theory due to his innovations and his ability (and willingness) to thinking in highly original ways. By embedding intractable problems, which have frustrated generations of mathematicians, into a `dynamical' setting richly endowed with newly discovered mathematical structures, he has opened the way to significant progress. Two famous examples are the 1929 Oppenheim Conjecture and the Littlewood Conjecture of the 1930s. Professor Margulis solved the first one in 1986 but the

second is still open. However, his dynamical reformulation of the Littlewood Conjecture has led to spectacular progress. The final goal is still proving elusive. So, over to you who are about to graduate and who like solving challenging problems! Perhaps this is something you might want to tackle in the days ahead. Given the fact that the Oppenheim Conjecture took 57 years to solve, you need to get a move on with this one. Since you might possibly be a candidate for the Fields medal if you did it before you reached the age of 40, I'd advise haste. No pressure then.

Those of you graduating today are faced with the complex challenges of our present, difficult, moment. While the Cold War is over, we have in its place new forms of fear and oppression, different threats to our freedom. In mathematics, science - and indeed in many other areas of our lives - a new viewpoint can be the key to solving old problems and lead to exciting innovations. We honour Professor Margulis today for his extraordinary contribution to mathematics, one founded in bringing together more than one area and showing how each can illuminate the other, transforming understanding.

Vice-Chancellor, I have the honour to present to you Professor Gregory Margulis for the degree of Doctor of the University, *honoris causa*.