Discurso de investidura como Doctor "Honoris Causa" del Excmo. Sr. Simon Kirwan Donaldson

20 de enero de 2017

Your Excellency Rector Andradas, Ladies and Gentlemen:

It is great honour for me to receive the degree of Doctor Honoris Causa from Complutense University and I thank the University most sincerely for this and for the splendid ceremony that we are enjoying today.

This University is an ancient institution and it is wonderful privilege to feel linked, through this honorary degree, to a long line of scholars reaching back seven and a half centuries. I would like to mention four names, all from comparatively recent times. First, **Eduardo Caballe,** a mathematician born in 1847 who was awarded a doctorate of Science by Complutense in 1873. Later, he was a professor in the University and, through his work and his students, had a profound influence in the development of mathematics in Spain, and worldwide. Second, a name that is familiar to all of us**: Albert Einstein**, who was awarded a doctorate Honoris Causa in 1923. Last, two great mathematicians from our era: **Vladimir Arnold** (Doctor Honoris Causa 1994) and **Jean-Pierre Serre** (2006). These are giants of the generation before my own from whom, at whose feet---metaphorically—I have learnt.

Besides the huge honour of joining such a group, it is interesting to trace one grand theme running the work of all these four people named. The theme I have in mind is the interplay between notions of *Geometry, Algebra* and *Space.* Of course Geometry begins with the exploration of the space we live in—the space of everyday experience. But a magical thing is that geometric intuition from that can be applied much further, to abstract spaces which are nevertheless central in mathematics—we can have a "geometric point of view" on almost any mathematical question. And of course Einstein teaches us that the geometry of our space, or space-time, is essentially different from that of experience. Since Descartes, we learn that geometry can be translated into algebra by imposing co-ordinates and one of Serre's great contributions has been to the foundations of modern algebraic geometry, in which that process was brought to new levels. But algebra does not replace geometric intuition and reasoning. The work of Caballe focused on the "synthetic" development of projective geometry, independent of algebra—indeed one can turn things around, making geometry primary and derive numbers and algebraic operations from geometric axioms of projective space. In a similar vein, one of Arnold's many discoveries was a geometric (or topological) proof of a fundamental algebraic fact—the insolubility of the general equation of degree five or more by radicals.

The exploration of this great theme connecting geometry, algebra and space---different ways of looking at the world, both the world of our experience and more abstract worlds---has taken place over millennia and is a framework for some of humanities greatest achievements. The exploration is not over, the same theme underlies many developments in contemporary mathematics, from the string theories of fundamental physics to the remarkable applications of algebraic geometry to purely arithmetic questions, such as Fermat's Last Theorem. Just as this exploration binds us to scholars down the centuries past, so we can look forward with confidence to lines of scholars in the future, developing these ideas in ways of which we have no inkling now.

I thank Professor Vicente Munoz for his kind words in his *Laudatio.* Vicente studied with me in Oxford around twenty years ago. It has been one of my great good fortunes to have been able to work with many wonderful doctoral students, like Vicente. Like him, many are now among the leaders in current mathematical research and indeed the same for many "grand-students". Equally important, many other doctoral students—after writing fine theses--- have gone on to great success in nother careers. Just as I am indebted to my own doctoral supervisors Michael Atiyah and Nigel Hitchin in countless ways for their support and teaching so I owe a debt of gratitude to these many students from whom I have learnt much. Again we can take joy in lines of students and teachers, stretching both into the past (notably in my case, through Atiyah and Hitchin to William Hodge) and into the future.

It remains only to repeat my thanks to the Rector and the University for this great honour and to my wife, Ana Nora, and all my family for their love and support.