

Acceptance speech

16 June of 2022

Jean-François Le Gall, awardee in the Basic Sciences category (14th Edition)

Let me first say that I am extremely honored to receive this award from the BBVA Foundation. I am also glad to share this award with Professor Fefferman, who is one of the great mathematicians of our times.

Let me try to explain the mathematical contributions for which I have received this prestigious award. I have worked a lot on Brownian motion, which is a mathematical model for a purely random curve. In the last 15 years, however, my area of research has been the definition and study of random geometry in two dimensions. This line of research is motivated by the physical theory known as quantum gravity, which aims at unifying general relativity and quantum mechanics. It would be too long to describe the connection between random geometry and quantum gravity in detail, but I can try to explain how random geometry is constructed. To this end, imagine a world consisting of a large number of cities located on a sphere like the earth. Some of these cities are connected by roads that do not cross except at cities, and the distance between two cities A and B is measured by the minimal number of cities one has to cross when going from A to B by following the roads. The point is now to choose the configuration of cities and roads completely at random: this can be done in a precise mathematical way, and one can then prove, for instance, that the typical distance between two cities is roughly of the same size as the total number of cities raised to the power $1/4$. In the limit where the number of cities and the number of roads tend to infinity, one arrives at a model called the Brownian sphere, which is a new fundamental mathematical object. Most of my recent research contributions have dealt with the construction of this model and of several variants, and the study of their properties.

The Frontiers of Knowledge Award has a major significance for me as it means the recognition of the importance of the new field of research which I have developed together with colleagues all around the world. It is also a strong encouragement for me to push forward this line of research.

In conclusion, let me say that I have had fruitful contacts with Spanish colleagues for a long time. In particular, my very last PhD student, who came



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from Barcelona to France for his doctoral studies, is an extremely talented young Spanish mathematician, who has made deep contributions to the Brownian sphere. For these reasons, I am also very happy to receive this award here in Spain.