



Global COE Seminar

第11回 離散幾何解析セミナー

日 時: 4月23日(金) 午後1時–2時30分
場 所: 京都大学理学研究科3号館552号室
講 演 者: Robert Sinclair 氏 (沖縄科学技術研究基盤整備機構)
題 目: What causes Flat Dendritic Bifurcations?

アブストラクト:

The neurons of our nervous system possess often quite complex tree-like structures, called dendritic trees. These are sometimes almost perfectly planar, but typically fill some volume. Their function is, broadly speaking, to receive input to the neuron. Dendritic trees are themselves also capable of some information processing. Their properties, including purely geometrical ones, are therefore of great interest to neuroscience. A single dendritic tree is, generically, a rooted binary tree. It was observed several decades ago that the local branchings of dendritic trees are typically flat. This raises a number of fundamental questions such as:

- (i) What is the most appropriate way to measure "flatness"?
- (ii) What would be the distribution of this quantity for "random binary trees"?
- (iii) What can we potentially learn about the growth of neurons from comparing the distribution of this quantity in "random binary trees" to its distribution in actual dendritic trees?
- (iv) Finally, what do we mean when we say "random binary tree"?

This is work being performed in collaboration with the neuroscientists Drs. Erik De Schutter (PI) and Yihwa Kim of the Okinawa Institute of Science and Technology. I will focus on the mathematical aspects of the work, in particular relating to stochastic geometry, but putting stress on the need to devise definitions and approaches which are also meaningful from a biological point of view.