Directions in Computability Theory

A Meeting in Memory of S. Barry Cooper
(1943-2015)

Abstracts

Andrea Sorbi (University of Siena)

Strong positive reducibilities: density and structure inside degrees

(This is joint work with Keng Meng Ng.) A *strong positive reducibility* is a reducibility which is strongly contained in enumeration reducibility, and such that the corresponding degree structure has a least element which is comprised of exactly the computably enumerable sets. We study density and non-density issues relative to some natural strong positive reducibilities, as well as structure of their degrees inside enumeration degrees. The most interesting and useful strong positive reducibility is *singleton reducibility*, or *s-reducibility*. For this reducibility, we solve two open problems raised by Barry Cooper, showing in particular: (1) the Δ^0_2 s-degrees are not dense; (2) every nonzero enumeration degree contains infinitely many s-degrees.

Marat Arslanov (Kazan State University)

Cooper's Research in the Difference Hierarchy

My talk will be devoted to the Turing degree structures in the difference hierarchy, in which area major contributions have been made by Barry Cooper with his students and colleagues. In my talk I will give a brief survey of his research in this area and discuss the current status of a number of related open questions.

Theodore Slaman (University of California, Berkely)

The Δ^0_2 Turing Degrees: structure, definability and Cooper's question

We will discuss methods to interpret arithmetic structures within the partial order of the Turing degrees of the Δ^0_2 sets. We will give two applications. The first is a solution of sorts to a question of Cooper concerning the common theory (over all sets X) of the interval of Turing degrees $[X, X']$. The second, obtained jointly with Mariya Soskova, is to show that there is a finite automorphism base for $[0, 0']$. It follows that the automorphism group of $[0, 0']$ is countable.

Andrew Lewis-Pye (London School of Economics)

The Jump Classes

The jump classes were introduced by Barry and independently by Bob Soare back in the 70s, and have become a central object of study in degree theory. This will be a talk aimed both at experts and non-experts. I'll begin by defining the jump hierarchy and establishing some of the basic facts. Then we'll go on to consider more recent results, many of them by students of Barry, and some nice open questions which might lead to natural definability results.