Prof Chong Chi Tat *(left)*
and Prof Yang Yue *(right)*
Department of Mathematics

Profs Chong and Yang have investigated extensively generalised theories of computation. Their work is showcased in a paper in collaboration with Prof Theodore A Slaman of the University of California at Berkeley. Entitled "The metamathematics of stable Ramsey's theorem for pairs", the paper was published in the Journal of American Mathematical Society (2014), acknowledged to be one of the four most prestigious journals in mathematics.

"**L**ogic, our area of research, is at the intersection of three disciplines of human endeavour: mathematics, philosophy and computer science. It appeals to people who are interested in technically challenging problems with fundamental underpinnings of a philosophical nature. A particular area of logic has to do with the idea of computation through the work of Alan Turing. The fact that logic connects all three is fascinating.

Our research focuses on questions related to the general concept of computability and definability. Many mathematical questions deal with the existence of mathematical objects. We are interested in knowing how "easy" or "difficult" it is to find such objects. This is measured by how one is able to describe or define, in a mathematically rigorous manner, the solutions. We are also interested in looking at problems whose solutions require new tools and ideas.

There are a number of challenges one faces in working on a problem. The key one is not knowing where the work will lead to or what the answer is going to be.

Another challenge is to understand and analyse a mathematical problem, to identify the source of difficulties, and resolve them. It is like looking at a big jigsaw puzzle that has been looked at by many others, and to put the pieces correctly to form a picture. Many times, one experiences repeated failures.

Fortunately, you can try different ways or the same way many times while looking at a problem. And it is extremely rewarding when one discovers an idea that works, sometimes after many years of hard work. No word can describe the joy and level of satisfaction when this comes through.

The field of mathematical logic is enormous and one can spend a lifetime on it. The main interest in the subject has to do with the desire to understand the concept of infinity, and to see how the idea of computation is explained through that understanding. It would also be interesting to study more closely the connection between logic and other fields of mathematics.

There are still many challenging questions in reverse mathematics. There are also many wonderful ideas that are lost because too much attention was paid to technical developments. By tracing the history of the subject, perhaps one could rediscover important ideas that are useful for current and future research."