

综合报告会

# Lecture

国家数学与交叉科学中心

Time: 10:00 am, June 7, 2012

Venue: S703

## *Some Combinatorial Problems Motivated by their Applications*



**Speaker: Prof. Gyula O.H. Katona**

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### ***Abstract:***

Search problems. There is one unknown (e.g. defective) element  $x$  of an  $n$ -element set. We have to determine it by asking questions of type “is  $x \in A$ ?” for some subsets  $A$ . Of course the mathematical question is finding the minimum number of such questions under some conditions. We will show some examples.

Consider the relational model of databases. It is basically a matrix where the columns are the kinds of data (attributes), the rows are the data of one individual or object. We say that a set  $A$  of columns (attributes) functionally determines the set of columns  $B$  if there are no two different rows equal in  $A$  and different in  $B$ . The set of these functional dependencies can be equivalently described by a closure operation on the set of columns. Some properties of these closure operations are investigated.

A practical problem of identifying objects by labels (small pictures) that cannot be copied lead to a combinatorial problem of the following type. Having a family of  $k$ -element subsets, minimize the number of  $k-1$ -element subsets included in one of them.

In addition, as a former director of Rényi Institute of Math, I will also make a brief introduction on its history and presence.

### ***Brief CV:***

Katona 教授是国际知名组合数学专家，欧洲科学院院士和匈牙利科学院院士，曾任匈牙利科学院瑞尼数学研究所所长（1996-2006）。