

---

# The S.-T. Yau Mathematics Awards

by Hong-Wei Xu<sup>\*</sup> and Yng-Ing Lee<sup>†</sup>

## S.-T. Yau High School Mathematics Awards Winners, 2014

### Gold Awards

School: The High School Attached to Hunan Normal University

Members: Zerui Tan

Adviser: Yongxing Cheng

Title: On the Square-Free Numbers in Shifted Primes

### Silver Awards

School: Zhengzhou Foreign Language School

Members: Jianqiao Xia, Yuxiang Jin, Mengzhe Zhang

Adviser: Siqing Cao

Title: Analysis of the Number of Distinct Prime Factors of  $t(\alpha^n - \beta^n)$

School: Arcadia High School, USA

Members: George Hou

Adviser: Jack Xin

Title: Separating Mixed Signals in a Noisy Environment Using Global Optimization

### Bronze Awards

School: No. 2 Secondary School Attached to East China Normal University

Members: Yixi Shen

Adviser: Zhongyuan Dai

Title: Study on the Properties of Circumscribed Ellipses of Convex Quadrilaterals

School: No. 2 Secondary School Attached to East China Normal University

Members: Yiming Ding

Adviser: Chengpeng Zhang

Title: Recognizing Zombie Fans in Microblog Based on Bayesian Theory

School: Tianjin Yaohua High School

Members: Ran Tao, Shuo Yu

Adviser: Xiang Lu

Title: On generalizations of an inequality

School: The Wellington School, USA

Members: Peter Tian

Adviser: Jesse Geneson

Title: Extremal Functions of Forbidden Multidimensional Matrices

School: West Windsor-Plainsboro High School North, USA

Members: Brice Huang

Adviser: Wuttisak Trongsirawat

Title: A Generalization of G-parking Functions and Related Algebras

### Honorable Mention

School: The High School Attached to Tsinghua University

Members: Sicong Huang

Adviser: Wenbing Xu

Title: Study on the Relative periodicity and the Long-term behavior of Hypocycloid and Quasicycloid

School: Beijing National Day School

Members: Jiaqi Wang, Lide Cai, Daheng Min

Adviser: Xiangxue Jia

Title: The Diameter of (Directed) Graphs

School: The Affiliated High School of SCNU

Members: Sheng Zhou

Adviser: Peng Gui

Title: New Probe into Combinatorial Identities

---

<sup>\*</sup> Zhejiang University, Hangzhou, Zhejiang, China

E-mail: xuhw@zju.edu.cn

<sup>†</sup> Department of Mathematics, National Taiwan University, Taipei, Taiwan

E-mail: yilee@math.ntu.edu.tw

## Dongrun–Yau Science Awards (Mathematics) Winners, 2015

(Formerly known as the S.-T. Yau High School Mathematics Awards.)

### Gold Awards

School: No. 2 Secondary School Attached to East China Normal University  
Members: Zhenhua Liu  
Adviser: Zhongyuan Dai  
Title: An Asymptotic Formula in Number Theory

### Silver Awards

School: High School Affiliated to Fudan University, Pudong Campus  
Members: Zihong Chen  
Adviser: Junjie Wen  
Title: On the evaluation of some infinite series

School: High School Affiliated to Shanghai Jiao Tong University  
Members: Deshu Chen  
Adviser: Lei Hou  
Title: Investigation on a Class of Infinite Number Sequences Which Satisfy Benford's Law

School: Neuqua Valley High School, USA  
Members: Sarvasva Raghuvanshi  
Adviser: Stephen S.-T. Yau  
Title: A Proof of the Yau Geometric Conjecture in 6 Dimensions

### Bronze Awards

School: Beijing National Day School  
Members: Jianyou Wang  
Adviser: Guoshuang Pan  
Title: Estimate of the electric potential outside a bounded charged conductor

School: Beijing 101 Middle School  
Members: Guangyuan Zhu  
Adviser: Jianyu Liu  
Title: Study on High-Dimensional Extension of Pick's Theorem

School: Dongguan Middle School, SSL School  
Members: Tao Li  
Adviser: Dongsheng Wen  
Title: Some New Littlewood-Type Inequalities

School: The Affiliated High School of SCNU  
Members: Ziyuan Lv, Yuyu Guo  
Adviser: Jizhu Wei  
Title: Probability of an Acute Triangle in the Two-dimensional Spaces of Constant Curvature

School: Shenzhen High School  
Members: Zhe Kong, Yilin Ye

Adviser: Wentao Zhang  
Title: Three Generalizations of the Secretary Problem

School: Woodbridge High School, USA  
Members: Spencer Sheen  
Adviser: Hongkai Zhao  
Title: A Coordinate Descent Method for Robust Matrix Factorization and Applications

### Honorable Mention

School: No. 2 Secondary School Attached to East China Normal University  
Members: Licheng Hua  
Adviser: Zhongyuan Dai  
Title: Further Research of Tianji Horse Racing

School: Nanjing Foreign Language School  
Members: Chunyang Xie, Zicen Pan, Yuqi Zhang  
Adviser: Yang Gao  
Title: A Study on Prediction Algorithms for Yu'EBao Capital Flow

School: The Affiliated High School of Peking University  
Members: Weichen Gao, Cheran Sun  
Adviser: Zhichao Shan  
Title: The Rationality of the Vertices of a Regular Simplex or Semiregular Simplex in  $R^n$  or LP-space over  $R^2$

School: Han Dan No. 1 High School  
Members: Yuxuan Yang  
Adviser: Xinding Xi  
Title: A Study of the Approximation of  $e$

School: Dalian Jinzhou Senior High School  
Members: Hengjia Zhang  
Adviser: Jie Li  
Title: Study on a Type of Geometric Iteration

School: Guangdong Experimental School  
Members: Hongzheng Chen, Zhihan Li, Mingwei Chen  
Adviser: Wanfeng Liang  
Title: On Concurrent Lines Related to Miquel Points

School: Shenzhen High School  
Members: Yuepeng Yang  
Adviser: Wentao Zhang  
Title: A Hypothesis Testing Method Based on Sample and Two Types of Errors

## S.-T. Yau High School Mathematics Awards in Taiwan

In the year 2009, Professor Shing-Tung Yau initiated to hold an annual mathematics competition for high school students in Taiwan, aiming to promote intellectual discovery and to stimulate scientific creativity among the youth of Taiwan. This idea was

made possible thanks to the generous support from Dr. Fan-cheng Tseng, the Vice Chairman of TSMC.

Each team shall consist of one student and shall be led by a teacher of the same school. Even though the student may receive some advice from the teacher, it is required for the student to perform an independent study. The topic can be any problem in pure or applied mathematics of any level. There is no limitation of the mathematical machinery involved in the research, however, the student must demonstrate his command of the tools that were exploited.

Among all teams, about eight to twelve teams was advanced into the final competition each year. There will be:

1. No more than one Gold Award, which is NTD 60,000 for the student and NTD 30,000 for the teacher.
2. No more than three Silver Award, which is NTD 40,000 for each student and NTD 20,000 for each teacher.
3. Honorable Mentions, which is NTD 20,000 for each student and NTD 10,000 for each teacher.
4. Judge's Award, which is NTD 5,000 for each student.

A school will receive Excellent Group Award if there are more than two awardees from the same school and at least one of them is awarded Gold or Silver medal. The awardees of Gold Award and Silver Award will receive scholarship up to NTD 480,000 and NTD 240,000 respectively if they major in Mathematics or Applied Mathematics during their studies in university.

The award has stimulated young students for mathematical studies. Many of the awardees and participants chose to major in mathematics at the end.

The Award also drew lots of attention from the society. For example, the touching story of the 2012 gold medalist Che-Kuan Su was on TV and the interesting works of every year's gold medalist and silver medalists appeared in all major newspaper.

#### **Gold Award, 2014**

Topic: Walk through hive - unique way with least numbers

Member: Ya-Qi Zhu

School: Taipei First Girls High School

#### **Silver Awards, 2014**

Topic: A study on Regular Polygons and Reflected Polygons that pass three given points

Member: Shang-Wen Yao

School: Kaohsiung Municipal Kaohsiung Senior High School

#### **Gold Award, 2015**

Prize not awarded

#### **Silver Awards, 2015**

Topic: Mora Evolution- use Recursive Series to describe the process of the game

Member: Shao-Hong Yang

School: Taipei Municipal Jianguo High School

Topic: On the geometrically invariant property of the sum of the ratios of the directed segments obtained by connecting the vertices of the  $n$  polygons and polyhedrons with a fixed point

Member: You-Jun Zhuang

School: National Lu Kang Senior High School