



清华大学数学科学系
Department of Mathematical Sciences, Tsinghua University



清华大学丘成桐数学科学中心
Yau Mathematical Sciences Center, Tsinghua University

Shiing-Shen Chern A Great Geometer of the 20th Century

A Conference for the 110th Anniversary
of the Birth of Professor Shiing-Shen Chern

Conference Manual



10-14 October, 2021
Tsinghua University



Shiing-Shen Chern
1911-2004

A Couplet Composed in Tribute to Late Mentor Shiing-Shen Chern

*The cosmos was transformed by him single-handed, Topologist thus
starting to know what curvature meant, and Geometer to learn global
picture, Consulted by later ages Chern classes shall always see;*

*True pillar of the State was he unrivalled, with Disciples across
the world, Matchless is his vision and sagacity in the universe,
Remembered by future generations the master will eternally be.*

*Pupil Shing-Tung Yau
August 2021*

书联呈陈省身老师

只手换乾坤，拓扑知曲率，几何化宏观，后学永参陈氏类；
无双真国士，弟子遍寰球，卓识贯六合，先生长留万世名。

弟子丘成桐 二零二一年八月

Water Dragon Chant: On the Birth Centenary of Late Mentor Shiing-Shen Chern

*Raising my head to see the clouds dispersing a thousand miles, in the boundless sky the vast galaxy hangs.
Night is silent and lamplight dusky, remembrance so endless runs, whether or not his soul returns?
Nankai by the Bo Hai Sea, Tsinghua of water and groves, both are still blessed with
handsome talents.
Longing to climb high and look far away, into the wilderness of the cosmos, the past in remote
distance, who remembers?
Recalling Chu Shun-shui fleeing to Japan^{*}, earning immortal fame with his influence,
embodying the quintessence of the Han's.
Pouring out mathematical thinking as water falls, eternally worshipped by the entire world, his
unparalleled attainments.
The master lived into his nineties, natural, simple, clear, noble, all those whirling years.
Weighing achievements, on a par with the Tsu father and son and Ch'in Chiu-shao's, in
geometry stand Chern classes.*

Shing-Tung Yau

August 12, 2010

^{*} Shiing-Shen Chern first officially published paper was printed on Tuhoku Journal of Japan in 1935.

'Triads of rectilinear congruences with generators in correspondence', Tohoku Math. J. 40 (1935) 179–188.

舉頭千里靈收星河長掛天無際夜靜
 燈昏迨思無限魂歸來未海畔南開清
 華水木尚存俊氣想登樓眺遠茫茫宇
 內悠悠事誰能記猶憶東傳舜水盡流
 勞漢家風味籌思如瀉世間長拜斯人
 絕藝九十華年婆娑歲月自然清貴算
 功名二祖秦韶差逮幾何陳類

水龍吟 省身師百歲冥辰
 丘成桐作于二零一零年八月十日

Written by Shing-Tung Yau

in 2010 to commemorate the 100th anniversary of birth of Professor

Shiing-Shen Chern



清 華 學 堂

Contents

02 About the Conference

04 Archive of Shiing-Shen Chern

04 Photos of Shiing-Shen Chern

06 Chern at Tsinghua University

10 Schedule

14 Opening Speeches

18 Academic Talks

50 Directions

Shiing-Shen Chern: A Great Geometer of the 20th Century

110th Anniversary Conference of the Birth of Professor Shiing-Shen Chern

Professor Shiing-Shen Chern was born on October 26th, 1911, which is September 5th, 1911 according to the Lunar Calendar. We dedicate this conference to commemorate his 110th anniversary of birth, which turns out to be October 10th of this year in the Lunar Calendar.

Professor Shiing-Shen Chern was admitted by Tsinghua University as a graduate student in September 1930. As he was the only graduate student in the department that year, he served as a teaching assistant till the fall 1931, and then he began his graduate studies. He got the master's degree in the summer 1934 from Tsinghua.

In 1932, Chern met Blaschke who gave a series of lectures on web theory in Beijing. After Tsinghua, Chern went to Hamburg University to study with Blaschke, and he got his PhD in 1936. In 1937, Chern became a professor in Tsinghua and then a professor in Southwest Associated University, a position he held till his moved to the United States in 1943.

About the Conference

Scientific Committee

Shing-Tung Yau

Tsinghua University

Shiu-Yuen Cheng

Tsinghua University

Organizing Committee

Baohua Fu

Academy of Mathematics and Systems Science

Bong Lian

Brandeis University

Xiaokui Yang

Tsinghua University

Wenming Zou

Tsinghua University

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Photos of Shiing-Shen Chern



1916



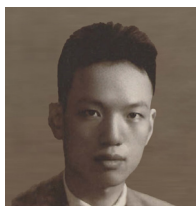
1929



1930



1930 Graduated
from Nankai



1934



1934 Hamburg



1946 Shanghai



1950 Chicago



1972 Tianjin



1979 Berkley

牛刀小試呈初篇
 垂老方知學問難
 四十一年讀舊作
 荷花時節傳新知
 同文同志尋真理
 一心一德探精微
 莫道晴人天地小
 喜看後學繼前賢
 以初任二高曾表於東北數學
 劉詠一九三三三四年
 一九七四年八月再訪東北大學承
 任本重大教授熱情招待并
 會見在座領導下之青年數
 學家多人雖談學問快慰充
 已念共東大回錄緬成雜句
 外詩也
 陳省身識
 一九七四年八月廿一日
 乙卯仲夏重遊於加州

Archive of Shiing-Shen Chern



1986

廿一世紀
數學大國
數學教學
三十周年之六
陳省身



1992



1996



2000



2004 Hong Kong

Source: Collected Works of Shiing-Shen Chern

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

一期星

日五十月九年九十國民華中

中華民國郵政特准掛號認爲新聞紙類

每星期一三五出版

國立清華大學校刊

啓事

校刊社啓事

本校因暑假期中，除少數必要出版外，其餘均告停刊。自九月十五日起，恢復校內刊例。特此聲明。

校刊社啓

九月二十日

國立清華大學校刊

號〇〇二第

目要

正正
第三十三次校務會議
校務會議
學生生活紀實
文藝
軍事

啓事

校刊社啓事

本校因暑假期中，除少數必要出版外，其餘均告停刊。自九月十五日起，恢復校內刊例。特此聲明。

校刊社啓

九月二十日

第三十年度錄取新生學號姓名表

第一版

本學年度錄取新生學號姓名表

行開學式時全體新生屆時出席此布

校務會議九月二十日

註冊部通告第一號

九月二十日

公佈此布

| 第一年度 | | | 第二年度 | | | 第三年度 | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 116 鄭文雄 | 117 鄭文雄 | 118 鄭文雄 | 119 鄭文雄 | 120 鄭文雄 | 121 鄭文雄 | 122 鄭文雄 | 123 鄭文雄 | 124 鄭文雄 |
| 125 鄭文雄 | 126 鄭文雄 | 127 鄭文雄 | 128 鄭文雄 | 129 鄭文雄 | 130 鄭文雄 | 131 鄭文雄 | 132 鄭文雄 | 133 鄭文雄 |
| 134 鄭文雄 | 135 鄭文雄 | 136 鄭文雄 | 137 鄭文雄 | 138 鄭文雄 | 139 鄭文雄 | 140 鄭文雄 | 141 鄭文雄 | 142 鄭文雄 |
| 143 鄭文雄 | 144 鄭文雄 | 145 鄭文雄 | 146 鄭文雄 | 147 鄭文雄 | 148 鄭文雄 | 149 鄭文雄 | 150 鄭文雄 | 151 鄭文雄 |
| 152 鄭文雄 | 153 鄭文雄 | 154 鄭文雄 | 155 鄭文雄 | 156 鄭文雄 | 157 鄭文雄 | 158 鄭文雄 | 159 鄭文雄 | 160 鄭文雄 |
| 161 鄭文雄 | 162 鄭文雄 | 163 鄭文雄 | 164 鄭文雄 | 165 鄭文雄 | 166 鄭文雄 | 167 鄭文雄 | 168 鄭文雄 | 169 鄭文雄 |
| 170 鄭文雄 | 171 鄭文雄 | 172 鄭文雄 | 173 鄭文雄 | 174 鄭文雄 | 175 鄭文雄 | 176 鄭文雄 | 177 鄭文雄 | 178 鄭文雄 |
| 179 鄭文雄 | 180 鄭文雄 | 181 鄭文雄 | 182 鄭文雄 | 183 鄭文雄 | 184 鄭文雄 | 185 鄭文雄 | 186 鄭文雄 | 187 鄭文雄 |
| 188 鄭文雄 | 189 鄭文雄 | 190 鄭文雄 | 191 鄭文雄 | 192 鄭文雄 | 193 鄭文雄 | 194 鄭文雄 | 195 鄭文雄 | 196 鄭文雄 |
| 197 鄭文雄 | 198 鄭文雄 | 199 鄭文雄 | 200 鄭文雄 | 201 鄭文雄 | 202 鄭文雄 | 203 鄭文雄 | 204 鄭文雄 | 205 鄭文雄 |
| 206 鄭文雄 | 207 鄭文雄 | 208 鄭文雄 | 209 鄭文雄 | 210 鄭文雄 | 211 鄭文雄 | 212 鄭文雄 | 213 鄭文雄 | 214 鄭文雄 |
| 215 鄭文雄 | 216 鄭文雄 | 217 鄭文雄 | 218 鄭文雄 | 219 鄭文雄 | 220 鄭文雄 | 221 鄭文雄 | 222 鄭文雄 | 223 鄭文雄 |
| 224 鄭文雄 | 225 鄭文雄 | 226 鄭文雄 | 227 鄭文雄 | 228 鄭文雄 | 229 鄭文雄 | 230 鄭文雄 | 231 鄭文雄 | 232 鄭文雄 |
| 233 鄭文雄 | 234 鄭文雄 | 235 鄭文雄 | 236 鄭文雄 | 237 鄭文雄 | 238 鄭文雄 | 239 鄭文雄 | 240 鄭文雄 | 241 鄭文雄 |
| 242 鄭文雄 | 243 鄭文雄 | 244 鄭文雄 | 245 鄭文雄 | 246 鄭文雄 | 247 鄭文雄 | 248 鄭文雄 | 249 鄭文雄 | 250 鄭文雄 |
| 251 鄭文雄 | 252 鄭文雄 | 253 鄭文雄 | 254 鄭文雄 | 255 鄭文雄 | 256 鄭文雄 | 257 鄭文雄 | 258 鄭文雄 | 259 鄭文雄 |
| 260 鄭文雄 | 261 鄭文雄 | 262 鄭文雄 | 263 鄭文雄 | 264 鄭文雄 | 265 鄭文雄 | 266 鄭文雄 | 267 鄭文雄 | 268 鄭文雄 |
| 269 鄭文雄 | 270 鄭文雄 | 271 鄭文雄 | 272 鄭文雄 | 273 鄭文雄 | 274 鄭文雄 | 275 鄭文雄 | 276 鄭文雄 | 277 鄭文雄 |
| 278 鄭文雄 | 279 鄭文雄 | 280 鄭文雄 | 281 鄭文雄 | 282 鄭文雄 | 283 鄭文雄 | 284 鄭文雄 | 285 鄭文雄 | 286 鄭文雄 |
| 287 鄭文雄 | 288 鄭文雄 | 289 鄭文雄 | 290 鄭文雄 | 291 鄭文雄 | 292 鄭文雄 | 293 鄭文雄 | 294 鄭文雄 | 295 鄭文雄 |
| 296 鄭文雄 | 297 鄭文雄 | 298 鄭文雄 | 299 鄭文雄 | 300 鄭文雄 | 301 鄭文雄 | 302 鄭文雄 | 303 鄭文雄 | 304 鄭文雄 |
| 305 鄭文雄 | 306 鄭文雄 | 307 鄭文雄 | 308 鄭文雄 | 309 鄭文雄 | 310 鄭文雄 | 311 鄭文雄 | 312 鄭文雄 | 313 鄭文雄 |
| 314 鄭文雄 | 315 鄭文雄 | 316 鄭文雄 | 317 鄭文雄 | 318 鄭文雄 | 319 鄭文雄 | 320 鄭文雄 | 321 鄭文雄 | 322 鄭文雄 |
| 323 鄭文雄 | 324 鄭文雄 | 325 鄭文雄 | 326 鄭文雄 | 327 鄭文雄 | 328 鄭文雄 | 329 鄭文雄 | 330 鄭文雄 | 331 鄭文雄 |
| 332 鄭文雄 | 333 鄭文雄 | 334 鄭文雄 | 335 鄭文雄 | 336 鄭文雄 | 337 鄭文雄 | 338 鄭文雄 | 339 鄭文雄 | 340 鄭文雄 |
| 341 鄭文雄 | 342 鄭文雄 | 343 鄭文雄 | 344 鄭文雄 | 345 鄭文雄 | 346 鄭文雄 | 347 鄭文雄 | 348 鄭文雄 | 349 鄭文雄 |
| 350 鄭文雄 | 351 鄭文雄 | 352 鄭文雄 | 353 鄭文雄 | 354 鄭文雄 | 355 鄭文雄 | 356 鄭文雄 | 357 鄭文雄 | 358 鄭文雄 |
| 359 鄭文雄 | 360 鄭文雄 | 361 鄭文雄 | 362 鄭文雄 | 363 鄭文雄 | 364 鄭文雄 | 365 鄭文雄 | 366 鄭文雄 | 367 鄭文雄 |
| 368 鄭文雄 | 369 鄭文雄 | 370 鄭文雄 | 371 鄭文雄 | 3 | | | | |

1930 Tsinghua University Graduate Admission Announcement

Archive of Shiing-Shen Chern



1932 Tsinghua University Research Institute Group Photo

Shiing-Shen Chern: the second from right of the last row



1934 Tsinghua University Mathematical Sciences Society

Shiing-Shen Chern: the first from left of the middle row

Source: Tsinghua University History Museum

擬與南方自京爲難惟由京向無江解之可貴況今後與各國開通力合作尤
爲重要之急故擬聘歐先生三所設法籌京物理所正五聘中之中缺歐先生
素志壯且小特不勉力籌備所當無不多祇須共持有人隨時可應京爲難此
項任務自難身兼先生早日回唐主持莫無弟謹知
最誠困難然之數所前給鈔稿一印但今省身先生已回粵北上啓
應其於六月間所至爲企盼至於九章先生前於前月辭職擬進行氣象研究
工作外併擬致力於大地物理之研究臣與歐先生議及亦甚贊同現正着手
處此次院務會議決已聘物理所兼職分工作基礎氣象所主持

國立中央研究院用笈

月滿先生大鑒本院組織及評議會條例已將立法院修正通過今後有待全國
學術界人士之合作進修完成國家學院之體制本院設學研究所目錄備案今忽
忽五年後因交通阻隔難期聘請研究設備擬定人士在在均感困難茲復員
東亞通訊人員大費可以判所而並設設備等項經立夫先生赴美之便而擬聘
均已辦到茲將研究所成立之條件概已具報擬於本年七月一日正式宣告
成立其所任一職副的請立夫先生繼任並請陳省身先生爲代理所長謹立夫先
生在美研究期間有一年且爲獨立科學研究之基礎必須立設理化研究之
中心我國幅員廣袤北方自以北京爲宜但北平已有清華大學及北京大學兩具

國立中央研究院用笈

Academia Sinica wrote to Tsinghua President
about appointing Shiing-shen Chern as the
acting director of Mathematical Sciences
Research Center

錄風氣象課程因甚重要現時九章先生萬難兼顧尤
關諸君候聘來局份好研究通訊候候氣象所本年中心事業稍展續自可
酌量留學在歐京平地期能蒙國書社承辦此致
台鑒
朱彥祥 拜成
三月廿四日

國立中央研究院用笈

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Venue

10-11 October, 2021

10 月 10-11 日

Lecture Hall of Main Building, Tsinghua University

清华大学主楼后厅

12-14 October, 2021

10 月 12-14 日

Cheng Yu-Tung Lecture Hall, Tsinghua University

清华大学郑裕彤讲堂

Join Zoom Meeting

Zoom ID : 228 011 0844

Passcode: Chern110

October 10

| Time | Speaker |
|-------------|---|
| 08:30-09:20 | Opening Speech |
| | Yong Qiu (Tsinghua University) |
| | Shing-Tung Yau (Tsinghua University) |
| | Lo Yang (Academy of Mathematics and Systems Science) |
| | Robbert Dijkgraaf (Institute for Advanced Study) |
| | Caucher Birkar (Tsinghua University) |
| | Wenming Zou (Tsinghua University) |
| 09:20 | Hung-Hsi Wu (University of California, Berkeley) |
| | Group Photo |
| 09:20 | Tea Break |
| 09:40-10:30 | Shing-Tung Yau (Tsinghua University) |
| 10:50-11:40 | Robbert Dijkgraaf (Institute for Advanced Study) |
| 11:50 | Lunch Break |
| 13:00-13:50 | Xiangyu Zhou (Academy of Mathematics and Systems Science) |
| 14:10-15:00 | Claire Voisin (Institut Mathématique de Jussieu) |
| 15:00 | Tea Break |
| 15:20-16:10 | Maxim Kontsevich (Institut des Hautes Études Scientifiques) |

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

October 11

| Time | Speaker |
|-------------|--|
| 08:30-09:20 | Caucher Birkar (Tsinghua University) |
| 09:20 | Tea Break |
| 09:40-10:30 | Simon Donaldson (Imperial College) |
| 10:50-11:40 | David Eisenbud (University of California, Berkeley) |
| 11:50 | Lunch Break |
| 13:00-13:50 | Yiming Long (Nankai University) |
| 14:10-15:00 | Hélène Esnault (Freie Universität Berlin) |
| 15:00 | Tea Break |
| 15:20-16:10 | Jean-Pierre Bourguignon (Institut des Hautes Études Scientifiques) |

October 12

| Time | Speaker |
|-------------|--|
| 08:30-09:20 | Jun Li (Fudan University) |
| 09:20 | Tea Break |
| 09:40-10:30 | Benson Farb (University of Chicago) |
| 10:50-11:40 | Valentino Tosatti (Northwestern University) |
| 11:50 | Lunch Break |
| 13:00-13:50 | Chuu-Lian Terng (University of California, Irvine) |
| 14:10-15:00 | Nicolai Reshetikhin |
| 15:00 | Tea Break |
| 15:20-16:10 | Ngaiming Mok (University of Hong Kong) |

October 13

| Time | Speaker |
|-------------|---|
| 08:30-09:20 | Shicheng Wang (Peking University) |
| 09:20 | Tea Break |
| 09:40-10:30 | Daniel S. Freed (University of Texas at Austin) |
| 10:50-11:40 | Tristan Collins (Massachusetts Institute of Technology) |
| 11:50 | Lunch Break |
| 13:00-13:50 | Kefeng Liu (University of California, Los Angeles) |
| 14:10-15:00 | Conan Nai Chung Leung (Chinese University of Hong Kong) |
| 15:00 | Tea Break |
| 15:20-16:10 | Michael Harris (Columbia University) |

October 14

| Time | Speaker |
|-------------|-------------------------------------|
| 08:30-09:20 | Xiping Zhu (Sun Yat-sen University) |
| 09:20 | Tea Break |
| 09:40-10:30 | Robert Bryant (Duke University) |
| 10:50-11:40 | Xiaotao Sun (Tianjin University) |

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern



Yong Qiu

President of Tsinghua University



Shing-Tung Yau

Tsinghua University

Opening Speeches



Lo Yang

Academician of the Chinese Academy of Sciences



Robbert Dijkgraaf

Institute for Advanced Study

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern



Caucher Birkar

Tsinghua University



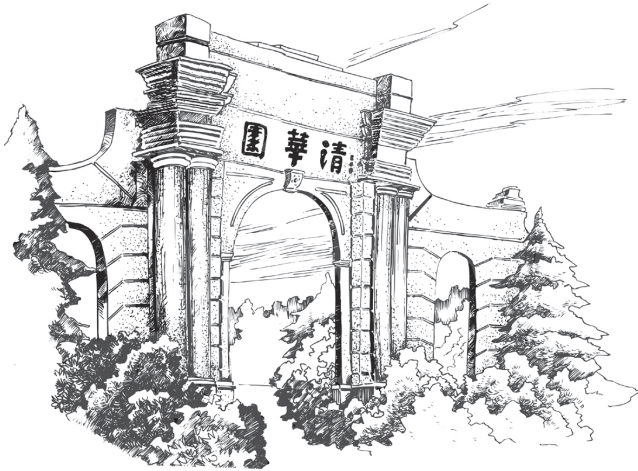
Wenming Zou

Tsinghua University



Hung-Hsi Wu

University of California, Berkeley



Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Shiing-Shen Chern: As a Great Geometer of the 20th Century



Speaker

Shing-Tung Yau

Director, Yau Mathematical Sciences Center

Dean, Qiu Zhen College of Tsinghua University

Director, Yanqi Lake Beijing Institute of Mathematical Sciences and Applications

Professor, Harvard University

Professor Yau has made fundamental contribution to differential geometry, differential equations and mathematical physics. He is a member of the United States National Academy of Sciences, a member of Russian Academy of Sciences, a foreign member of the Chinese Academy of Sciences.

Awards and honors:

| | |
|-----------|---|
| 2018 | Marcel Grossmann Awards |
| 2010 | Wolf Prize |
| 2010 | Asian American Engineers of the Year Award |
| 2010 | AAEOY Distinguished Science & Technology Award2003, China International Science and Technology Cooperation Award |
| 2003 | China International Scientific and Technological Cooperation Award |
| 1997 | United States National Medal of Science |
| 1994 | Crafoord Prize of Royal Swedish Academy of Sciences |
| 1991 | Humboldt Research Award, Alexander von Humboldt Foundation, Germany |
| 1985 | MacArthur Fellows |
| 1984 | Science Digest, America's 100 Brightest Scientists under 40 |
| 1982 | Fields Medal, International Congress of Mathematicians |
| 1981 | John J. Carty Award, United States National Academy of Sciences |
| 1981 | Oswald Veblen Prize in Geometry, American Mathematical Society |
| 1980 | John Simon Guggenheim Fellowship |
| 1979 | California Scientist of the Year |
| 1975-1976 | Sloan Research Fellowships |

9:40-10:30, Oct. 10

Lecture Hall of Main Building, Tsinghua University

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

The geometry of quantum physics



Speaker

Robbert Dijkgraaf

Institute for Advanced Study

Robbert Dijkgraaf is Director and Leon Levy Professor of the Institute for Advanced Study (2012–current), one of the world's foremost centers for curiosity-driven basic research, located in Princeton, New Jersey. A prominent mathematical physicist, Dijkgraaf is an impassioned and eloquent advocate for pure scientific inquiry and the vital importance of encouraging creativity, imagination, and “out of the box” thinking. As a scientist, Dijkgraaf has made significant contributions to string theory. His research focuses on the interface between mathematics and particle physics. In addition to finding surprising and deep connections between matrix models, topological string theory, and supersymmetric quantum field theory, Dijkgraaf has developed precise formulas for the counting of bound states that explain the entropy of certain black holes.

Abstract: I will survey some of the ideas shedding light on the relation between mathematics and quantum theory, in particular the algebraic and geometric aspects of string theory and quantum gravity.

10:50-11:40, Oct.10
Online

Some recent results on multiplier ideal sheaves



Speaker

Xiangyu Zhou

Academy of Mathematics and Systems Science

Professor Xiangyu Zhou is a Chinese mathematician working on several complex variables and complex geometry. He is famous in the L^2 -extension methods and their applications. He solved several fundamental and long-standing open conjectures in the disciplines of physics and mathematics, including the extended future tube conjecture and the strong openness conjecture.

Professor Xiangyu Zhou gave an invited address in ICM2002, and delivered the keynote speech in the Abel Symposium 2013. He was the director of the Institute of Mathematics, Chinese Academy of Sciences from 2003 to 2012, and is a member of the Chinese Academy of Sciences since 2013.

Abstract: In this talk, we first recall the basic properties of multiplier ideal sheaves, and then present some new properties including strong openness (solution of Demailly's strong openness conjecture) and stability, and some immediate consequences and further development.

13:00-13:50, Oct.10

Lecture Hall of Main Building, Tsinghua University

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

On the cobordism classes of hyper-kähler manifolds with summary



Speaker

Claire Voisin

Institut Mathématique de Jussieu

Claire Voisin is a member of the Académie des sciences (Paris). In September 2016, she was awarded the CNRS Gold medal, the highest scientific award in France. Voisin is recognized for her work on Hodge theory and algebraic cycles. She is known particularly for her construction of compact Kähler manifolds not homeomorphic to complex projective manifolds, for her proof of the generic Green conjecture on syzygies of canonical curves, and for her contribution to the stable Lüröth problem.

Abstract: This talk is devoted to the subring of the complex cobordism ring which is generated by almost complex manifolds with trivial odd Chern classes. The motivation for this study is the theory of hyper-Kähler manifolds. Our main result says that punctual Hilbert schemes of K3 surfaces and generalized Kummer manifolds generate multiplicatively this ring with rational coefficient. This is joint work with Georg Oberdieck and Jieao Song.

14:10-15:00, Oct.10
Online

Quantum minimal surfaces



Speaker

Maxim Kontsevich

Institut des Hautes Études Scientifiques

Maxim Kontsevich is a permanent professor at Institut des Hautes Études Scientifiques, France. He won the Fields Medal in 1998 for his work in algebraic geometry and algebraic topology. His first success was to prove a conjecture of fellow Fields Medalist Edward Witten about the moduli space of algebraic curves. He then extended these ideas to produce many new invariants for knots and three-dimensional manifolds. He established theorems about the number of rational curves on Calabi-Yau three-manifolds that proved decisive in the development of mirror symmetry, a theory that unites methods from mathematical physics and classical algebraic geometry.

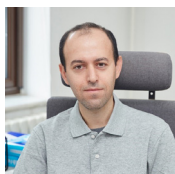
Abstract: There is so called the Schild functional on the space of maps from a symplectic surface to a Riemannian manifold, whose critical points are minimal surfaces. The quantum analog of such a map is a collection of almost-commuting self-adjoint operators in a Hilbert space. Remarkably, the quantum version of the Schild action is the Yang-Mills functional on transnational-invariant connections. I will talk about quantum minimal surfaces in Euclidean space and in flat tori, analogs of calibrated geometry, theory of degree etc. The talk is based on a joint work with J.Arnold and J.Hoppe, arXiv:1903.10792.

15:20-16:10, Oct.10
Online

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Moduli of algebraic varieties



Speaker

Caucher Birkar

Tsinghua University

Caucher Birkar is currently a professor at the Yau Mathematical Sciences Center, Tsinghua University, Beijing, China. He works in algebraic geometry (higher dimensional, birational, minimal model program, moduli theory). His work involves various topics such as minimal models, Fano and Calabi-Yau and general type varieties, singularity theory, positive characteristic geometry, etc. In joint work with Paolo Cascini, Christopher Hacon, and James McKernan, Birkar proved the existence of minimal models for varieties of general type and the finite generation of canonical rings. These results have had a major impact on research in algebraic geometry. He was awarded the Fields Medal in 2018.

Abstract: The moduli theory of curves goes back as far as 19th century. For each integer g at least 2 there is a moduli space parametrizing smooth projective curves of genus g . This can be compactified by adding stable nodal curves of genus g . In recent years this has been extended to every dimension, that is, there is a compact moduli space of stable varieties of general type. The purpose of this talk is to discuss moduli of varieties of arbitrary Kodaira dimension. We introduce stable minimal models and explain how the moduli theory may be generalized to such varieties.

8:30-9:20, Oct.11

Lecture Hall of Main Building, Tsinghua University



Speaker

Simon Donaldson

Imperial College

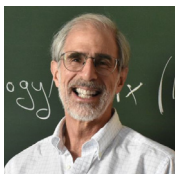
Simon Donaldson is a Royal Society Research Professor at Department of Mathematics, Imperial College, London. His research interests lie at differential & algebraic geometry and global analysis. Among his most noted achievements are his proof of the diagonalizability theorem sometimes referred to as Donaldson's theorem, and his algebraic invariants of four-manifolds codified into what are now called the Donaldson polynomial invariants. These results relied on his study of gauge theory of principal bundles over four-manifolds, a theory closely related to ones intensively studied by physicists. His more recent work includes the introduction of pencils of curves in a symplectic four-manifold and his study of extremal metrics, including Kahler-Einstein metrics on Fano varieties, and the relation of these to algebro-geometric stability. In 1986 he was awarded the Fields Medal for his work in the geometry and topology of 4-dimensional manifolds, and was elected a Fellow of the Royal Society.

9:40-10:30, Oct. 11
Online

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Residual intersections: old and new



Speaker

David Eisenbud

University of California, Berkeley

David Eisenbud is currently a director of Mathematical Sciences Research Institute, and professor of Mathematics at University of California, Berkeley, USA. His primary research area is Algebra. His research interests lie at Algebraic geometry, Commutative algebra, and Computation. Ever since the early 70s he has used computers to produce examples in algebraic geometry and commutative algebra, and has developed algorithms to extend the power of computation in this area.

Abstract: The first computations of residual intersections were done in the 19th Century. In modern times the ideas developed in two parallel streams: enumerative formulas were worked out by Fulton, Kleiman and their schools, while Artin and Nagata started a deep study of local properties. I will explain the basic problem and its historical roots, and then describe some new results in the local case that are joint work of mine with Bernd Ulrich.

10:50-11:40, Oct.11
Online

Index iteration theories for periodic orbits with applications



Speaker

Yiming Long

Nankai University

Yiming Long is a Professor at the Chern Institute of Mathematics, Nankai University, China. His research interests include Hamiltonian dynamics, variational methods, symplectic geometry, Riemannian and Finsler geometry, as well as celestial mechanics. He is a member of the Chinese Academy of Sciences (since 2007), a fellow of Third World Academy of Sciences (TWAS, since 2008). His awards and honours include Shiing-Shen Chern Award (1998) and Loo-Keng Hua Prize (2017) by the Chinese Math. Soc., the National Natural Science Award of China (2004) by the State Council of China, and TWAS Award in Mathematics (2004) by TWAS.

Abstract: In this talk, I shall give a survey on the index iteration theories for periodic solution orbits of various problems in the last more than 60 years, including some applications to periodic solution problems in Hamiltonian dynamics, closed geodesic problems, and N-body problems in celestial mechanics.

13:00-13:50, Oct. 11

Online

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Rigid local systems: arithmetic properties



Speaker

H  l  ne Esnault

Freie Universit  t Berlin

H  l  ne Esnault is Einstein Professor at the Freie Universit  t Berlin. She received her PhD in 1976 from the Universit   Paris-Diderot, under the supervision of L   D  ng Tr  ng. She has made outstanding contributions to many areas of modern Algebraic Geometry, from complex projective manifolds to varieties in positive characteristic and arithmetic geometry. The exceptional variety of her research interests--including cohomological methods, motives and Chow groups, deformation theory, singularities and rational points--makes her a unique expert in the field. Among many honours, she was awarded the Prix Paul Doistau-  mile Blutet of the Acad  mie des Sciences de Paris in 2001, the Gottfried Wilhelm Leibniz Prize in 2003, and the Cantor medal in 2019. She is a member of the Academia Europaea and the Nationale Akademie der Wissenschaften Leopoldina.

Abstract: Rigid local systems should be motivic (Simpson's 1990 conjecture, shown by Petrov (2020) using Scholze's theory to be a consequence of the Fontaine-Mazur conjecture). Clearly the conjecture is inaccessible except in dimension 1 where it is a theorem of Katz. With Michael Groechenig we proved some consequences of it: the integrality conjecture formulated by Simpson (1990), and the crystallinity conjecture formulated by us (2018). Those in turn have consequences which we shall present.

14:10-15:00, Oct.11
Online

Revisiting S.S. Chern's article *the geometry of G-structures* 55 years after its publication



Speaker

Jean-Pierre Bourguignon

Institut des Hautes Études Scientifiques

Jean-Pierre Bourguignon is currently a Nicolaas Kuiper Honorary Professor at the Institut des Hautes Études Scientifiques (IHÉS), and- Directeur de recherche émérite at the Centre National de la Recherche Scientifique (CNRS). His field of predilection is differential geometry, particularly in its relations with partial differential equations and mathematical physics. He has focused his work on the Ricci curvature, both for its mathematical aspects and the role it plays in general relativity.

Abstract: The article *The Geometry of G-structures* by the late Professor Chern Shiing Shen published in 1966, i.e. 55 (=110/2) years ago, has been a landmark contribution to the recognition and the development of Differential Geometry. One should be aware that the very central role in Mathematics and Theoretical Physics that the field now enjoys is the result of a progressive transformation of the internal architecture of Mathematics in the second half of the century to which giants such as Professor Chern, Sir Michael Atiyah and Isadore M. Singer greatly contributed.

The article had a number of virtues of which I would like to highlight a few:

- it stresses the importance of groups in the development of Geometry, something acknowledged since Hermann von Helmholtz, Felix Klein, Henri Poincaré, and Élie Cartan to name just a few;

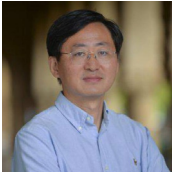
Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

- it contains arguments for the need to embrace all kinds of geometries almost on a somewhat equal footing even as Professor Chern states unambiguously that *not all the geometric structures are 'equal'*;
- it exhibits the interplay between traditional considerations of Differential Geometry with Topology, something that later became very central to the development of Geometry;
- last but not least, in the article, Professor Chern always includes global considerations at the same level as local geometric ones, which were still dominating at the time.

15:20-16:10, Oct.11
Online

A proof of Yamaguchi-Yau conjecture on the GW-invariants of quintic CY manifold



Speaker

Jun Li

Fudan University

Jun Li is currently a professor at the School of Mathematical Sciences, Fudan University, China. His research interests lie at Algebraic Geometry. His representative works include Kodaira dimension of moduli space of vector bundles on surfaces(1994), Virtual moduli cycles and Gromov-Witten invariants of algebraic varieties(1998), Rational curves on K3 surfaces; Inventiones Mathematicae(2012),etc.

Abstract: Yamaguchi-Yau conjectured that the potential function of the Gromov-Witten invariants of quintic Calabi-Yau manifold satisfies a polynomial structural result. We will brief our proof of this conjecture, following Witten's vision.

8:30-9:20, Oct.12

Cheng Yu-Tung Lecture Hall, Tsinghua University

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Rigidity of moduli spaces



Speaker

Benson Farb

University of Chicago

Benson Farb is currently a professor of mathematics at University of Chicago, USA. His interests include geometric group theory; low-dimensional topology; the interaction of differential geometry, Lie groups and their discrete subgroups; nonpositive curvature; as well as various interactions between topology, representation theory, algebraic geometry and number theory (especially concentrating on various moduli spaces, e.g. of polynomials, rational maps, Riemann surfaces, etc).

Abstract: Algebraic geometry contains an abundance of miraculous constructions. Examples include “resolving the quartic”; the existence of 9 flex points on a smooth plane cubic; the Jacobian of a genus g curve; and the 27 lines on a smooth cubic surface. In this talk I will explain some ways to systematize and formalize the idea that such constructions are special: conjecturally, they should be the only ones of their kind. I will state a few of these many (mostly open) conjectures. They can be viewed as forms of rigidity (a la Mostow and Margulis) for various moduli spaces and maps between them.

9:40-10:30, Oct.12
Online

The Chern-Ricci flow



Speaker

Valentino Tosatti

Northwestern University

Valentino Tosatti is a professor at Northwestern University, USA. He does research in Differential Geometry, Geometric Analysis, Complex Algebraic Geometry and Partial Differential Equations. Some specific topics are: Kähler geometry, Calabi-Yau manifolds, almost-complex, symplectic and Hermitian geometry, geometric flows, complex Monge-Ampère equations, transcendental methods in algebraic geometry, dynamics on K3 surfaces.

Abstract: The Chern-Ricci flow is a flow of Hermitian metrics by their Chern-Ricci form, which generalizes the Kahler-Ricci flow to the setting of non-Kahler metrics on complex manifolds, introduced by Weinkove and myself 10 years ago. I will give an overview of known results for this flow, including new phenomena that are not seen in the Kahler case, and describe some open problems.

10:50-11:40, Oct.12
Online

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Symmetries of the Schrödinger flow on CP^n



Speaker

Chuu-Lian Terng

University of California

Chuu-Lian Terng is a professor in the Mathematics department at University of California, USA. Her research interests lie at geometry and topology of submanifolds; isometric group actions; integrable Hamiltonian Systems, in particular soliton equations related to differential geometry. Her early research concerned the classification of natural vector bundles and natural differential operators between them. She then became interested in submanifold geometry. Her main contributions are developing a structure theory for isoparametric submanifolds in R^n and constructing soliton equations from special submanifolds.



We visited Chern at Nankai Institute in January 2003

Abstract: In this talk, I will give a summary of joint work with Karen Uhlenbeck on symmetries of the Schrödinger flow on \mathbb{CP}^n ,

$$\gamma_t = J(\nabla_{\gamma_x} \gamma_x)$$

where $\gamma : \mathbb{R} \times \mathbb{R} \rightarrow \mathbb{CP}^n$, J is the complex structure and ∇ is the Levi-Civita connection of \mathbb{CP}^n . We show that this flow is gauge equivalent to the *vector non-linear* Schrödinger equation, a soliton equation. Then we use techniques in soliton theory to show that this flow :

- is Hamiltonian with respect to two compatible Poisson structures,
- admits infinitely many commuting Hamiltonians, i.e., admits a Hamiltonian action of an infinite dimensional abelian group,
- admits a Poisson action of an infinite dimensional non-abelian group,
- has Bäcklund transformations that arise from a group action and produce explicit soliton solutions,
- has an action of the Virasoro algebra and tau functions.

13:00-13:50, Oct. 12
Online

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

The Poisson sigma model and semiclassical asymptotics for integrable systems



Speaker

Nicolai Reshetikhin

University of California, Berkeley

Nicolai Reshetikhin research interests lie at the interface of mathematical physics, geometry and representation theory, more specifically in quantum field theory, statistical mechanics, geometry and low-dimensional topology, and representation theory of quantum groups. Representation theory of quantum groups and of quantized universal enveloping algebras is the main algebraic structure behind integrability of most known "non-Gaussian" integrable models in classical and quantum mechanics, in field theory, and in statistical mechanics.

Abstract

The Poisson sigma model is a classical topological field theory with 2-dimensional space time and with a Poisson manifold as a target space. When the space time is a disc with three marked points on the boundary, perturbative quantization of the Poisson sigma model gives the Kontsevich's quantization of Poisson manifolds. In talk I will outline a series of conjectures for another choice of the space time. They describe semiclassical eigenfunctions of quantum integrable systems.

14:10-15:00, Oct.12
Online

Functional transcendence on quotients of bounded symmetric domains



Speaker

Ngaiming Mok

University of Hong Kong

Ngaiming MOK is currently a professor at Department of Mathematics, The University of Hong Kong, China. The areas of research interests of Professor Mok encompass Several Complex Variables, Complex Differential Geometry, Algebraic Geometry and Functional Transcendence Theory. In his research endeavors Mok has been focusing on uniformization problems, rigidity phenomena, deformation theory, curvature conditions and geometric structures. His research works have consistently and in particular most recently impacted the study of Kähler manifolds, uniruled projective manifolds, Schubert cycles, Shimura varieties, totally geodesic subsets and unlikely intersections arising from a variety of vibrant research areas in Mathematics. Professor Mok serves currently on the Editorial Boards of *Mathematische Annalen*, *Science China Mathematics* and *Chinese Annals of Mathematics*.

Abstract: Finite-volume quotients of bounded symmetric domains Ω , which are naturally quasi-projective varieties, are objects of immense interest to Several Complex Variables, Algebraic Geometry, Arithmetic Geometry and Number Theory, and an important topic revolves around functional transcendence in relation to universal covering maps of such varieties. While a lot has already been achieved in the case of Shimura varieties (such as the moduli space A_g of principally polarized Abelian varieties) by means of methods of Diophantine Geometry, Model Theory, Hodge Theory and Complex Differential Geometry, techniques for the general case of not necessarily arithmetic quotients $\Omega/\Gamma =: XX$ have just begun to be developed.

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

For instance, A_x -type problems for subvarieties of products of arbitrary compact Riemann surfaces of genus ≥ 2 have hitherto been intractable by existing methods. We will explain a differential geometric approach leading to characterization results for totally geodesic subvarieties of XX for the universal covering map $\pi: \Omega \rightarrow XX$.

Especially, we will explain how uniformization theorems for bi-algebraic varieties can be proven by analytic methods involving the Poincaré-Lelong equation in the cocompact case (joint work with S.-T. Chan in JDG (2021)), generalizing in the cocompact case earlier results of Ullmo-Yafaev (2011) in the case of arithmetic quotients. This is the first instance of a proof in which the ambient space XX may be of infinite volume, a context in which the known methods from model theory and Hodge theory fail to apply. More generally, we will consider the Zariski closures of images of algebraic sets under the universal covering map $\pi: \Omega \rightarrow XX$.

In the arithmetic case, Klingler-Ullmo-Yafaev (2016) resolved the hyperbolic A_x -Lindemann Conjecture in the affirmative ascertaining that such Zariski closures are weakly special (equivalently totally geodesic). I will explain how the arithmeticity condition can be dropped in the cocompact case by a completely different proof using foliation theory, Chow schemes, partial Cayley transforms and Kähler geometry.

15:20-16:10, Oct. 12
Online

Degree one maps between 4-manifolds with cyclic fundamental groups



Speaker

Shicheng Wang

Peking University

As a mathematician par excellence, Shicheng Wang is a member of the Chinese Academy of Sciences, a professor and doctoral supervisor of School of Mathematical Sciences. He is engaged in the research of low-dimensional topology, involving geometric group theory, fixed points, dynamical systems and algebraic topology.

Abstract: All manifolds are closed, connected and oriented. With the understandable picture on 3-manifolds provided by Thurston, the study of degree one maps between 3-manifolds has grown into an active topic in last several decades. The best understood 4-manifolds (after the simply-connected ones) are those with cyclic fundamental groups (finite or infinite), due to the work of Freedman, Quinn, Hambleton, Kreck and Teichner. We study degree one maps between 4-manifolds with cyclic fundamental groups. Some results about the existence, finiteness, as well as the relation with Euler characteristics are obtained. This is a joint work with Yang Su and Zhongzi Wang.

8:30-9:20, Oct. 13

Cheng Yu-Tung Lecture Hall, Tsinghua University

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

The dilogarithm and Chern-Simons invariants



Speaker

Daniel S. Freed

University of Texas at Austin

Daniel S. Freed is a professor in the Department of Mathematics at the University of Texas at Austin. He has worked on a variety of problems centering around global issues in geometry and global analysis. His work often relates to questions in theoretical physics (quantum field theory, string theory, and condensed matter theory), and I count physicists among my collaborators. Freed's work revolves around the mathematical ingredients and foundations of modern quantum field theory and of string theory, notably in its more subtle aspects related to quantum anomaly cancellation (which he was maybe the first to write a clean mathematical account of).

Abstract: In joint work (arXiv:2006.12565) with Andy Neitzke we construct the dilogarithm function via the Chern-Simons line bundle. I will begin the talk with a general account of Chern-Simons invariants, move on to the interpretation as an invertible field theory, and then construct the dilogarithm function and prove the basic identities using field theory techniques.

9:40-10:30, Oct.13

Online

SYZ mirror symmetry for del Pezzo surfaces and rational elliptic surfaces



Speaker

Tristan Collins

Massachusetts Institute of Technology

Tristan Collins has produced important results at the intersection of geometric analysis, partial differential equations and algebraic geometry. In joint work with Valentino Tosatti, Collins described the singularity formation of the Ricci flow on Kahler manifolds in terms of algebraic data. In recent work with Gabor Székelyhidi, he gave a necessary and sufficient algebraic condition for existence of Ricci-flat metrics, which play an important role in String Theory and mathematical physics. This result led to the discovery of infinitely many new Einstein metrics on the five dimensional sphere. With Shing-Tung Yau and Adam Jacob, Collins is studying the relationship between categorical stability conditions and existence of solutions to differential equations arising from mirror symmetry. He has Received 2021 Aisenstadt Prize.

Abstract: I will describe joint work with A. Jacob and Y.-S. Lin proving a strong form of the SYZ mirror symmetry conjecture for non-compact Calabi-Yau manifolds obtained from del Pezzo surfaces and rational elliptic surfaces.

10:50-11:40, Oct. 13

Online

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Extensions of holomorphic forms



Speaker

Kefeng Liu

University of California, Los Angeles

Kefeng Liu, is a Chinese-American mathematician who is known for his contributions to geometric analysis, particularly the geometry, topology and analysis of moduli spaces of Riemann surfaces and Calabi-Yau manifolds. He is a professor of mathematics at University of California, Los Angeles, as well as the Executive Director of the Center of Mathematical Sciences at Zhejiang University. He is best-known for his collaboration with Bong Lian and Shing-Tung Yau in which they establish some enumerative geometry conjectures motivated by mirror symmetry.

Kefeng Liu became a Frederick E. Terman Fellow from 1997 to 2001. During 1998 to 2001, he obtained P. Sloan fellowship and became Guggenheim Fellow in 2002. He won Morningside Gold Medal in Mathematics in 2004. He was an invited speaker at the International Congress of Mathematicians in 2002.

Abstract: I will present recent results on extensions of holomorphic forms under deformations of complex structures on Kahler manifolds by solving obstruction equations using Hodge theory.

13:00-13:50, Oct.13
Online

Quantum cohomology of flag varieties via wonderful compactifications



Speaker

Conan Nai Chung Leung

Chinese University of Hong Kong

Conan Nai Chung Leung is currently a professor at Department of Mathematics, Chinese University of Hong Kong, China. He is also an editor of the New York Journal of Mathematics (NYJM) and The Asian Journal of Mathematics (AJM). His fields of interest lie at Calabi-Yau Geometry, Closed and Open Gromov-Witten Invariants, SYZ Conjecture for Mirror Symmetry, Witten-Morse Theory, Quantization, Rozansky-Witten Invariants, Hyperkähler Geometry, Geometry of Special Holonomy and ADE Bundles over Complex Surfaces.

Abstract: Peterson conjectured that quantum cohomology ring of G/T is isomorphic to the homology of the based loop space of G after localization. Lam and Shimozono proved the conjecture by combinatorial method. We studied the wrapped Floer theory of the complexification of G and used the geometry of its wonderful compactification to give a geometric proof of this result. Our method extends to compact symmetric spaces as well. This is a joint work with Bae and Chow.

14:10-15:00, Oct.13
Online

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Derived structures in the Langlands program



Speaker

Michael Harris

Columbia University

Michael Harris is professor of mathematics at Columbia University, USA. He is the author or coauthor of more than seventy mathematical books and articles, and has received a number of prizes, including the Clay Research Award, which he shared in 2007 with Richard Taylor. His academic focus lies at Number Theory and Automorphic Forms. In 2019, he became a member of American Academy of Arts and Sciences.

Abstract: A *motive* M over Q is an object in a (still largely hypothetical) abelian category that contains (or “motivates”) the basic arithmetic and geometric properties of an algebraic variety over Q . One recognizes a motive of rank n through its *realizations*, which are vector spaces of dimension n over various fields endowed with different structures - the de Rham realization M_{dR} carries a (mixed) Hodge structure, whereas the l -adic realizations M_l carry representations of $\text{Gal}(\overline{Q}/Q)$.

The Langlands reciprocity conjectures attach to an irreducible rank n motive M a cuspidal automorphic representation $\Pi(M)$ of $GL(n, A_0)$; conversely, a certain class of cuspidal automorphic Π is expected to give rise to motives $M(\Pi)$. Those Π that contribute to cohomology of the locally symmetric space X_n attached to $GL(n, A_0)$ are known at least to give rise to l -adic Galois representations $M(\Pi)$. It has long been known that such Π contributes to cohomology of X_n in a string of l_0+1 successive degrees, where $l_0=n-[\frac{n}{2}]$.

Venkatesh has proposed that the Π -component of cohomology is a free rank one module over (roughly) the self-extension algebra of $M(\Pi)$; although the motive $M(\Pi)$ has not been constructed, Venkatesh has formulated a series of conjectures adapted to the different realizations. I will review these conjectures and report on my recent work with Darmon, Rotger, and Venkatesh that proves one of these conjectures in the very classical context of holomorphic modular forms of weight 1.

15:20-16:10 Oct.13
Online

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

Complete noncompact Kähler manifolds with positive curvature



Speaker

Xiping Zhu

Sun Yat-sen University

Zhu got his doctor's degree of science from Chinese Academy of Science in 1989, and has been working at Department of Mathematics in Sun Yat-sen University from then on. He works as the doctoral supervisor as well as the dean of the faculty. Zhu won the National Science Foundation for Distinguished Young Scholars of China in 1998, and was selected as Ministry of Personnel's Talents Project's first and second-level candidate the next year. In 1991, Zhu won the second prize of Natural Science Award of Chinese Academy of Science, and in December 2004, he won the ICCM Morningside Medal of Mathematics. From October 2009 to now, he was hired as the Chair Professor of Yat-sen Scholars from Sun Yat-sen University. Professor Zhu has been engaged in research of Pure Mathematics. He has made a series of important contributions to the field of geometry and topology of manifolds. Zhu solved several world-famous Mathematics open problems and conjectures.

Abstract: This talk is concerned with the classification of Kähler manifolds with positive bisectional curvature. It was asked by S.T. Yau whether any complete noncompact Kähler manifold with positive bisectional curvature is bi-holomorphic to the complex Euclidean space. The conjecture for the case of maximal volume growth has been recently confirmed. In this talk, we will consider the conjecture for manifolds with non-maximal volume growth. We will show that the finiteness of the first Chern number is an essential condition to solve Yau's conjecture by using algebraic embedding method. Furthermore, we can verify the finiteness in the case of minimal volume growth. This is a joint work with Bing-Long Chen.

8:30-9:20, Oct. 14

Cheng Yu-Tung Lecture Hall, Tsinghua University

The affine Bonnet problem



Speaker

Robert Bryant

Duke University

Robert Bryant is currently a professor at Department of Mathematics, Duke University, USA. His research concerns problems in the geometric theory of partial differential equations. More specifically, he works on conservation laws for PDE, Finsler geometry, projective geometry, and Riemannian geometry, including calibrations and the theory of holonomy. Much of his work involves or develops techniques for studying systems of partial differential equations that arise in geometric problems. He is also the Director of the Simons Collaboration Special Holonomy in Geometry, Analysis, and Physics.

Abstract: The classic problem of O. Bonnet is to determine whether a given surface in Euclidean 3-space can be isometrically deformed while preserving the mean curvature. After earlier work by Bonnet, W. Graustein, and E. Cartan, S.-s. Chern (1984) derived a characterization and classification, showing that, in addition to the well-known case of surfaces of constant mean curvature, there is an exceptional 4-parameter family of such surfaces with non-constant mean curvature and deriving some simple geometric properties of such surfaces.

The corresponding problem in affine geometry (another area in which Professor Chern did fundamental work) is more subtle and quite interesting. A locally strictly convex surface in affine 3-space inherits a well-defined metric, the Blaschke metric, and a mean curvature, and one can ask the corresponding question in affine 3-space: Which affine surfaces admit Blaschke-isometric deformations that preserve the mean curvature? I will provide answers for these questions and compare and contrast them with the results in the Euclidean case.

9:40-10:30, Oct.14

Online

Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern

A finite dimensional proof of the Verlinde formula



Speaker

Xiaotao Sun

Tianjin University

Xiaotao Sun is currently a professor at Tianjin University. His research interests lie at Algebraic geometry. He is the winner of National Science Fund for Distinguished Young Scholars, member of Higher Education Steering Committee of the Ministry of Education. He has won the second prize of the National Natural Science Award and the 14th Chen Shengshen mathematics award.

Abstract: A formula of dimensions for the spaces of generalized theta functions on moduli spaces of parabolic bundles on a curve of genus g , the so called Verlinde formula, was predicted by Rational Conformal Field Theories. The proof of Verlinde formula by identifying the spaces of generalized theta functions with the spaces of conformal blocks from physics was given in last century mainly by Beauville and Faltings (so called infinite dimensional proof). Under various conditions, many mathematicians tried to give proofs of Verlinde formula without using of conformal blocks, which are called finite dimensional proofs by Beauville. In this talk, we give unconditionally a purely algebro-geometric proof of Verlinde formula. Our proof is based on two recurrence relations, one of which establishes an inductive procedure for the genus of curves, another one provides an inductive procedure for the number of parabolic points. This is a joint work with Mingshuo Zhou.

10:50-11:40, Oct.14

Cheng Yu-Tung Lecture Hall, Tsinghua University

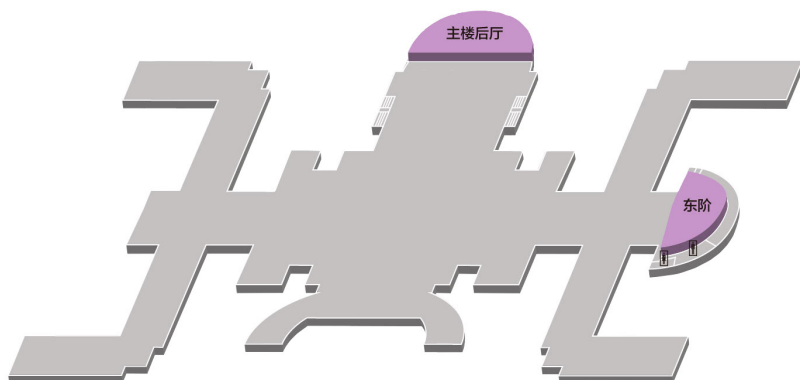


Shiing-Shen Chern: A Great Geometer of the 20th Century

A Conference for the 110th Anniversary of the Birth of Professor Shiing-Shen Chern



Lecture Hall of Main Building



Contacts

Organizing Committee

Ms. Zhu 010-6278 2534

Ms. Han 010-6279 2799

Media

Ms. Niu 010-6279 1789



清华大学数学科学系
Department of Mathematical Sciences, Tsinghua University



清华大学丘成桐数学科学中心
Yau Mathematical Sciences Center, Tsinghua University