

FINAL PROGRAM OF THE INTERNATIONAL SCHOOL
ON
PRECISION MEASUREMENT AND GRAVITY EXPERIMENT

國際精密測量與重力實驗研習會會程

JANUARY 24 - JANUARY 29, 1983
中華民國七十二年元月廿四日至廿九日

CHIEN-TAN YOUTH CENTER, No. 16, SECTION 4, CHUNG-SHAN
NORTH RD., TAIPEI
台北市中山北路四段16號劍潭青年活動中心

TELEPHONE 電話 : (02)596-2151

SCHOOL DIRECTORS : CHINN-CHANN CHIANG AND WEI-TOU NI
研習會主任 江慶章 倪維斗

SPONSORS 主辦單位 :

ACADEMIA SINICA, ROC 中央研究院
MINISTRY OF EDUCATION, ROC 教育部
NATIONAL SCIENCE COUNCIL, ROC 國家科學委員會
NATIONAL BUREAU OF STANDARDS, ROC 中央標準局
INDUSTRIAL TECHNOLOGY RESEARCH INSTITUTE 工業技術研究院
TELECOMMUNICATION LABORATORIES, ROC 交通部電信研究所
NATIONAL CENTRAL UNIVERSITY 國立中央大學
NATIONAL TSING HUA UNIVERSITY 國立清華大學

Sunday, 23 January 1983 劍潭青年活動中心

14:00 to Registration and Coffee Reception at
22:00 pm Chien-Tan Youth Center, No. 16, Section 4,
Chung-Shan North Rd., Taipei
報到與咖啡接待

Monday, 24 January 1983 劍潭青年活動中心志清堂

8:00 to Tea and Registration at Chien-Tan Youth
9:00 am Center, Taipei
註冊與茶水招待

9:00 to Basic Metrology
9:50 am 計量學基本原理
W.-T. Ni 倪維斗 (Tsing Hua U. 清華大學)

10:00 to Feedback Control in Physical Science:
10:50 A Layman's Approach (I)
回饋控制在物理科學中之應用 (I)
W.S. Cheung 張華坤 (Stanford U. 史丹福大學)

11:10 to Introduction to Precision Laser Spectroscopy (I)
12:00 noon 精密雷射光譜學介紹 (I)
J.-T. Shy 施宙聰 (Tsing Hua U. 清華大學) and
W.-S. Tse 謝雲生 (Academia Sinica 中央研究院)

12:00 noon LUNCH 午餐

13:30 to Fundamental Measurements and the Structure of
14:20 pm Matter at Short Distances
短距離下(高能量下)之基本測量與物質結構
C.C. Chiang 江慶章 (Academia Sinica 中央研究院)

14:30 to Mass Spectrometric Measurements of Isotopic
15:20 pm Masses and Abundances
應用質譜法測定原子核質量與同位素比
C.-S. Su 蘇青森 (Precision Instrument Develop-
ment Center 科儀中心)

15:30 to DISCUSSION 討論
16:30 pm All Lecturers Today 今日之演講者

Tuesday, 25 January 1983 元月廿五日 (星期二) 劍潭青年活動中心志清堂

- 8:30 to Measurement Assurance Program
9:30 am 計測保證方案
C.-Y. Ko 葛建業 (NBS, 中央標準局)
- 9:40 to Feedback Control in Physical Science:
10:40 am A Layman's Approach (II)
回饋控制在物理科學中之應用 (II)
W.S. Cheung 張華坤 (Stanford U. 史丹福大學)
- 11:00 to Introduction to Precision Laser Spectroscopy (II)
12:00 noon 精密雷射光譜學介紹 (II)
J.-T. Shy 施宙聰 (Tsing Hua U. 清華大學) and
W.-S. Tse 謝雲生 (Academia Sinica 中央研究院)
- 12:00 noon LUNCH 午餐
- 13:00 to Equivalence Principles, their Empirical Foundations,
14:20 pm and the Role of Precision Experiments to Test Them
等效原則與精密測量
W.-T. Ni 倪維斗 (Tsing Hua U. 清華大學)
- 14:30 to The Relativity Gyroscope Experiment at Stanford
15:20 pm University (I)
相對論迴轉儀實驗 (I)
W.S. Cheung 張華坤 (Stanford U. 史丹福大學)
- 15:30 to DISCUSSION on the history and properties of
16:30 pm inertial rotors and magnetic suspensions
慣性轉子與磁性懸浮之歷史與特性之討論
Carl H. Leyh (U. of Virginia 維吉尼亞大學)

Wednesday, 26 January 1983 元月廿六日 (星期三) 劍潭青年活動中心志清堂

- 8:30 to Special Invited Lecture
9:20 pm The Story of Gravitation : From Greek to Black Holes
重力的故事：從希臘人到黑洞
E. Teller (Hoover Institute 胡佛研究院 and Lawrence
Livermore National Laboratory 勞倫斯利佛摩實驗室)
- 9:30 to Advanced Geometric Metrology (I)
10:20 am 高等幾何計量學 (I)
M. Morimura (NRLM, Japan 日本國家計量研究所)

- 10:30 to Feedback Control in Physical Science : A
 11:20 am Layman's Approach (III)
 回饋控制在物理科學中之應用(III)
 W.S. Cheung 張華坤 (Stanford U. 史丹福大學)
- 11:30 to Introduction to Precision Laser Spectroscopy (III)
 12:20 am 精密雷射光譜學介紹(III)
 J.-T. Shy 施宙聰 (Tsing Hua U. 清華大學) and
 W.-S. Tse 謝雲生 (Academia Sinica 中央研究院)
- 12:20 noon LUNCH 午餐
- 13:50 to Introduction to Gravimeter and Gravity Prospecting (I)
 14:40 pm 重力儀與重力探勘法(I)
 C.C. Hu 胡錦城 (Chinese Petroleum Co. 中油公司)
- 14:50 to Introduction to Gravimeter and Gravity Prospecting (II)
 15:40 pm 重力儀與重力探勘法(II)
 C.C. Hu 胡錦城 (Chinese Petroleum Co. 中油公司)
- 16:00 to Temporal Variations of Earth Gravity
 16:50 pm 地球重力場之微變化
 Y. B. Tsai 蔡義本 (Academia Sinica 中央研究院)

Thursday, 27 January 1983 元月廿七日(星期四) 劍潭青年活動中心志清堂

- 8:30 to QUESTION AND DISCUSSION 問題與討論
 9:00 am
- 9:00 to Advanced Geometric Metrology (II)
 9:50 am 高等幾何計量學(II)
 M. Morimura (NRLM, Japan 日本國家計量研究所)
- 10:00 to The Physics of Basketball: An Introduction to
 10:50 am Scientific Thinking
 籃球之物理：科學思維之介紹
 J.E. Faller (JILA, 科羅拉多大學與美國國家標準局)
- 11:00 to Precision Laser Spectroscopy (I)
 11:50 am 精密雷射光譜學(I)
 W.H. Wing (U. of Arizona 亞歷桑那大學)
- 12:00 noon LUNCH 午餐
- 12:40 pm Buses Depart from Chien-Tan Youth Center to Hsinchu
 開車由劍潭青年活動中心往新竹
- 13:40 pm Arrive Hsinchu 抵達新竹

13:40 to Visit Industrial Technology Research Institute
15:40 pm 參觀工業技術研究院

15:40 to Visit Precision Instrument Development Center
17:00 pm and National Tsing Hua University
參觀國科會精密儀器中心及清華大學

17:00 pm Depart for Taipei 起程回台北

18:00 pm Arrive Taipei 回到台北

Friday, 28 January 1983 元月廿八日(星期五) 劍潭青年活動中心志清堂

8:30 to QUESTION AND DISCUSSION 問題與討論
9:00 am

9:00 to Advanced Geometric Metrology (III)
9:50 am 高等幾何計量學(III)
M. Morimura (NRLM, Japan 日本國家計量研究所)

10:00 to Telescopes and the Forces that Mold Them: An
10:50 am Introduction to Optics and Mechanical Design
望遠鏡和鑄造它們的各種力：光學和機械設計介紹
J.E. Faller (JILA, 科羅拉多大學與美國國家標準局)

11:10 to Precision Laser Spectroscopy (II)
12:00 noon 精密雷射光譜學(II)
W.H. Wing (U. of Arizona 亞歷桑那大學)

12:00 noon LUNCH 午餐

13:30 to The Relativity Gyroscope Experiment at Stanford
14:20 pm University (II)
相對論迴轉儀實驗(II)
W. S. Cheung 張華坤 (Stanford U. 史丹福大學)

14:30 to Rotor Dynamics
15:20 pm 轉子動力學
R.C. Ritter (U. of Virginia 維吉尼亞大學)

15:40 to Little "g": An Introduction to Dropping Things
16:30 pm 小 "g" (重力加速度)：落體介紹
J.E. Faller (JILA, 科羅拉多大學與美國國家標準局)

Saturday, 29 January 1983 元月廿九日(星期六) 劍潭青年活動中心志清堂

8:30 to QUESTION AND DISCUSSION 問題與討論

9:00 am

9:00 to Corotation in Gravity Experiments

9:50 am 重力實驗中之同步轉動

R.C. Ritter (U. of Virginia 維吉尼亞大學)

10:00 to The Fluid-Fiber Based Torsion Pendulum:

10:50 am An Alternative to Simply Getting a Bigger Hammer
流體扭秤：取代使用重錘之另一方法

J.E. Faller (JILA, 科羅拉多大學與美國國家標準局)

11:10 to Precision Laser Spectroscopy (III)

12:00 noon 精密雷射光譜學(III)

W.H. Wing (U. of Arizona 亞歷桑那大學)

12:00 noon CLOSING LUNCH 結業會餐

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ON
PRECISION MEASUREMENT AND GRAVITY EXPERIMENT
國際精密測量與重力實驗研討會會程

JANUARY 31 - FEBRUARY 2, 1983
中華民國七十二年元月卅一日至二月二日

AUDITORIUM, INSTITUTE OF EARTH SCIENCES, ACADEMIA SINICA
No. 1, SECTION 4, ROOSEVELD RD., TAIPEI
中央研究院地球科學館演講室(在台大校園內)

TELEPHONE 電話 : (02)396-3211 (四線)

SYMPOSIUM CHAIRMAN: WEI-TOU NI AND YI-BEN TSAI
研討會主席 倪維斗 蔡義本

SPONSORS 主辦單位 :

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Monday, 31 January 1983 元月卅一日 (星期一) 中研院地球科學館演講室

8:00 to Coffee and Registration, Institute of Earth
9:00 am Sciences, Academia Sinica, No. 1, Section 4,
Roosevelt Rd., Taipei

9:00 am OPENING CEREMONY

Chairman : Y.-B. Tsai 蔡義本

Welcome Address, Dr. Shih-Liang Chien, President
of Academia Sinica
錢思亮博士 (中央研究院院長)

Welcome Address, Dr. Hien Chee Fang, President of
the Industrial Technology Research
Institute
方賢齊博士 (工業技術研究院院長)

Guest Speech, Dr. James E. Faller, JILA

PMGE Outstanding Graduate Student Award

Recipient : Carl H. Leyh (U. of Virginia)

SESSION I LOW TEMPERATURE TECHNIQUES

Chairman : W.-T. Ni 倪維斗

9:40 am Low Temperature Techniques in Fundamental Measurements
and Gravity Experiments
C. W. F. Everitt (Stanford U.)

10:30 am Break

SESSION II METROLOGY AND PRECISION MEASUREMENT

Chairman : C.C. Chiang 江慶章

10:50 am The Current Status of the Vacuum and Optical
Calibration Laboratories in Precision Instrument
Development Center, National Science Council, R.O.C.
C.-S. Su 蘇青森

11:20 am Progress in Metrology and Precision Measurement
in Japan
M. Morimura (NRLM, Japan)

12:10 pm LUNCH

SESSION III TIME STANDARD AND RELIABILITY

- Chairman : Y.-N. Huang 黃胤年
13:40 pm On the Frequency and Time Standard in the
Telecommunication Laboratories
J.-F. Chen 陳政夫
(Telecommunication Laboratories, ROC)
- 14:20 pm Environmental Stress Testing for Reliability
Improvement
H.-Y. Lin 林合雲
(Telecommunication Laboratories, ROC)
- 14:50 pm Measurement Assurance Program
C.-Y. Ko 葛建業 (NBS, ROC)
- 15:20 pm Break

SESSION IV GRAVIMETER AND MICROGRAVITY

- Chairman : T.P. Yen 顏滄波
15:50 pm Promise and Plans for the New JILA Absolute
Gravimeter
J.E. Faller (JILA)
- 16:40 to Microgravity Studies of Crustal Deformation in Taiwan
17:20 pm Y.-H. Yeh 葉義雄 and Y.-B. Tsai 蔡義本
(Academia Sinica)

Tuesday, 1 February 1983 二月一日(星期二) 中研院地球科學館演講室

SESSION V : GRAVITATION AND GENERAL RELATIVITY

- Chairman : C.W.F. Everitt
8:30 am Implications of Hughes-Drever Experiments
W.-T. Ni 倪維斗 (Tsing Hua U.)
- 9:00 am Comments on the Implications of Hughes-Drever
Experiments
H. Yilmaz (Hamamatsu TV Co.)
- 9:15 am A Rotational Inertial Clock for Gravitational
Redshift Comparisons
C.H. Leyh, W.S. Cheung, B.E. Bernard, and R.C. Ritter
(U. of Virginia)
- 9:50 am Precision Rotors for Gravitation Experiments
R.C. Ritter and W.S. Cheung
(U. of Virginia)
- 10:30 am Break

SESSION VI GRAVITATION AND GENERAL RELATIVITY

Chairman : R.C. Ritter

10:50 am Spin, Torsion and Polarized Test-Body Experiments
W.-T. Ni 倪維斗 (Tsing Hua U.)11:20 am Gravitational Wave Experiment at Stanford University
C.W.F. Everitt

12:10 pm LUNCH

SESSION VII LUNAR LASER RANGING AND PROTON DECAY EXPERIMENT

Chairman : W.S. Cheung

13:40 pm The Lunar Laser Ranging Experiment — Present
Status
J.E. Faller (JILA)14:30 pm Proton Decay Experiment
H. Yilmaz (Hamamatsu TV Co.)

15:10 pm Break

SESSION VIII PRECISION LASER SPECTROSCOPY

Chairman : C.Y. Leung 梁忠義

15:30 pm Neutral Atom Trapping
W.H. Wing (U. of Arizona)16:20 pm Laser Spectroscopy of Triatomic Hydrogen
Molecular Ion
J.-T. Shy 施宙聰 (Tsing Hua U.)17:10 to 17:40 pm Laser Spectroscopic Studies of the Diffusive Motion
of Atoms
C.-L. Pan 潘犀靈 (Chiao Tung U.)

18:30 pm CLOSING DINNER

Wednesday, 2 February 1983 二月二日(星期三) 中研院地球科學館演講室

SESSION IX : PRECISION MEASUREMENT

Chairman : Y.-W. Chan 陳耀華

8:30 am Precision Laser Spectroscopy and Metrology
W.H. Wing (U. of Arizona)9:10 am A Prototype Measurement of the Newtonian
Gravitational Constant G Utilizing a Magnetically
Suspended Torsion Pendulum
J.E. Faller (JILA)9:50 am Precision Experiments at Stanford University
C.W.F. Everitt

10:40 am Break

SESSION X : PANEL DISCUSSIONS
Chairman : T.-S. Wen 溫鼎勳
11:00 am Panel Discussion on the Prospects of Metrology
and Precision Measurement
Moderator : J.E. Faller
Panelists : C.W.F. Everitt, C.Y. Leung, Morimura,
J.-T. Shy, C.-S. Su, W.H. Wing
11:40 am Panel Discussion on the Prospects of Gravity
Experiment
Moderator : W.-T. Ni 倪維斗
Panelists : W. Stephen Cheung, C.W.F. Everitt,
J.E. Faller, C.H. Leyh, R.C. Ritter
12:10 pm LUNCH

SESSION XI BROWNIAN MOTION AND MAGNETIC SUSPENSION
Chairman : C.Y. Ko 葛建業
13:40 pm Experimental Studies of the Brownian Motion:
A Review
M. Morimura (NRLM, Japan)
14:30 pm Properties of a Double Magnetic Suspension
B.E. Bernard, W.S. Cheung and R.C. Ritter
(U. of Virginia)
15:10 pm Break

SESSION XII PICOSECOND PHYSICS
Chairman : W.S. Tse 謝雲生
15:30 pm Picosecond Laser Spectroscopy
C.Y. Leung 梁忠義 (National Central U.)
16:20 pm Test of One-Way Velocity of Light and Relativity
of Simultaneity
H. Yilmaz (Hamamatsu TV Co.)
17:00 pm Concluding Remarks
W.-T. Ni 倪維斗
17:05 pm Adjournment

EXHIBITION AND DEMONSTRATION

The following items will be in exhibition:

Quartz gyro

Quartz housing with deposited electrodes

SQUID magnetometer

Magnetic suspension model

La Coste gravimeter

The magnetic suspension model and the La Coste
gravimeter (with a sensitivity of 5×10^{-6} g) will
be demonstrated