

A Feasible Roadmap for CEGO

(China Einstein Gravitational
Wave Observatory)

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National Astronomical Observatory

Chinese Academy of Sciences

LIGO-G050512-00-Z



$$\begin{aligned}
 \left. \begin{aligned}
 \mu\nu \\
 l
 \end{aligned} \right] &= \frac{1}{2} \left(\frac{\partial g_{\mu l}}{\partial x_\nu} + \frac{\partial g_{\nu l}}{\partial x_\mu} - \frac{\partial g_{\mu\nu}}{\partial x_l} \right) \\
 (m) &= \frac{1}{2} \left(\frac{\partial^2 g_{im}}{\partial x_{ik} \partial x_{kl}} + \frac{\partial^2 g_{kl}}{\partial x_i \partial x_m} - \frac{\partial^2 g_{il}}{\partial x_k \partial x_m} - \frac{\partial^2 g_{km}}{\partial x_i \partial x_l} \right) \\
 &+ \sum_{\rho\sigma} \delta_{\rho\sigma} \left(\begin{bmatrix} im \\ \rho\sigma \end{bmatrix} \begin{bmatrix} kl \\ \rho\sigma \end{bmatrix} - \begin{bmatrix} il \\ \rho\sigma \end{bmatrix} \begin{bmatrix} km \\ \rho\sigma \end{bmatrix} \right)
 \end{aligned}$$

$$\frac{\partial}{\partial x_k} \begin{bmatrix} il \\ \rho\sigma \end{bmatrix} - \frac{\partial}{\partial x_i} \begin{bmatrix} km \\ \rho\sigma \end{bmatrix}$$

Grossmann
 tensor calculus
 Mannigfaltigkeit

爱因斯坦的笔记本上的标记：格罗斯曼帮助爱因斯坦，1912年
 Remarque in Einstein's notebook: Grossmann helps Einstein, 1912

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100

GO GO

2005.3

Institutes and Universities

NAOC	(USTC)
(SIOM	(BNU)
(IHEP)	(PKU)
(ITP)	(Tchingham U)
(MechSA)	(Zhejiang U)
(MeteoSA)	(Shanghai CU)

with Collaborations of LIGO, VIRGO, AIGO,

GEO, TAMA

Institutes and Universities

1. **National Astronomical Observatory , CAS**
2. **China Academy of Machinery Science**
3. **Shanghai Institute of Optics and Fine Machinery , CAS**
4. **University of Science and Technology of China**
5. **Beijing Normal University**
6. **National Institute of Metrology**
7. **Peking University**
8. **Institute of High Energy Physics, CAS**
9. **Institute of Geophysics, CAS**

Tsinghua University

Institute of Geophysics, CAS

National Astronomical Observatory CAS(NAOC) main activities

- **Moon Exploration**
- **LAMOST (telescope)**
- **SST (space solar telescope)**
- **CEGO (GW observatory)**

University of Science and Technology of China

- Dept. Physics, Dept. of Astrophysics
- Dept. Modern Physics
- Applied Optics

- **Theoretical Study**

- **Laser**

- **Optical**

China Academy of Machinery Science (activities relevant to CEGO)

- **Control System**
- **Vacuum System**

Beijing Normal University

Peking University

- **Theoretical Study**
- **Data Analyses**

National Institute of Metrology (NIM)

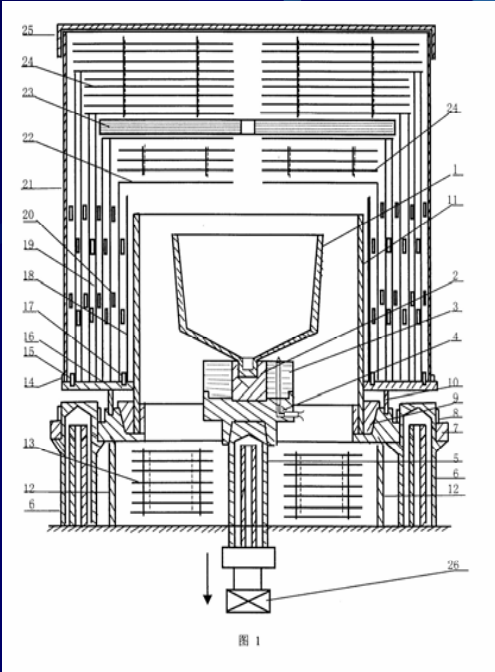
NIM deal with these main tasks:

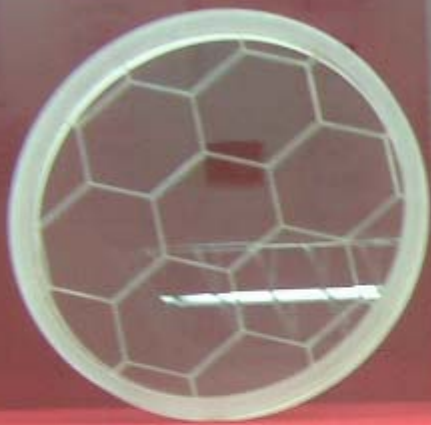
- develop and run primary standard equipment, including length, temperature, time etc.
- carry out experiments of calibration for China and other countries

Shanghai Institute of
 Optics and Mechanics

(SIOM)

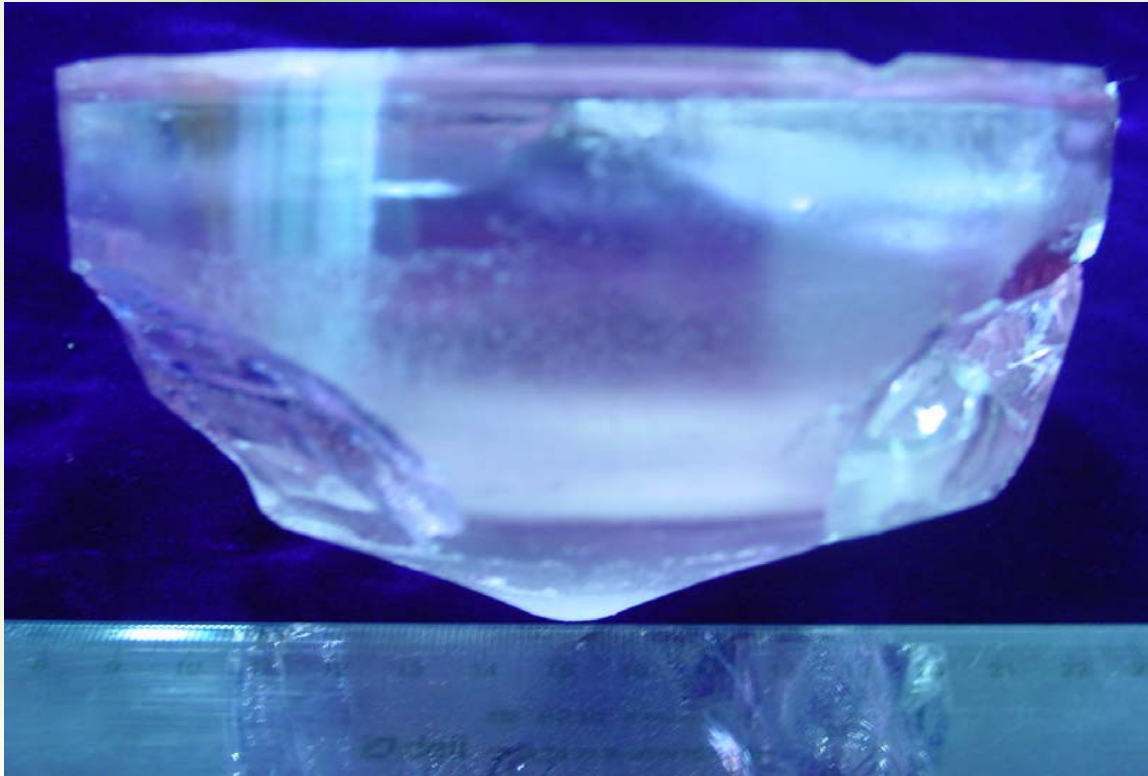
TGT Furnace for Growing Large Sized Sapphire







Φ 140mm Sapphire Crystals





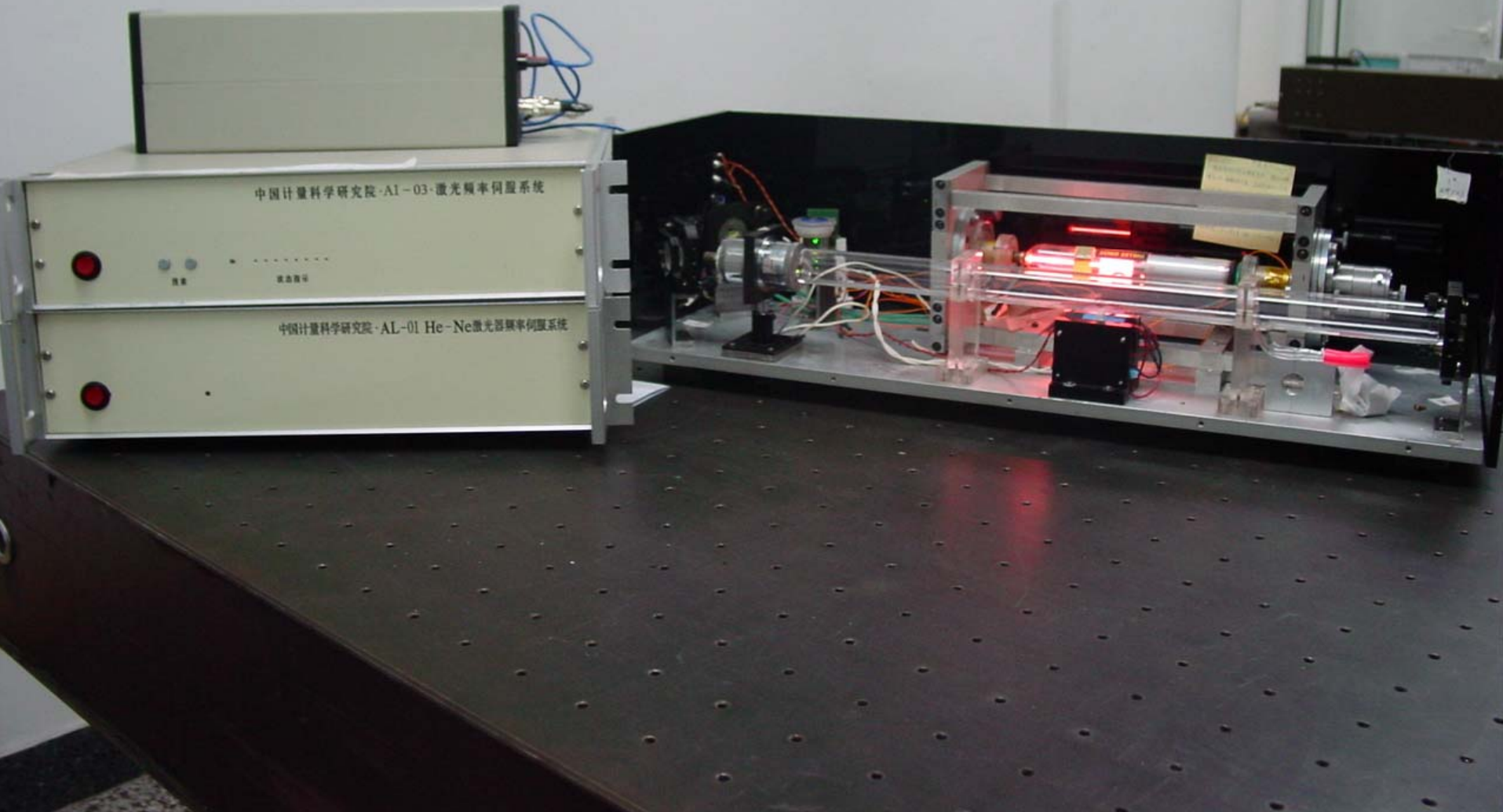
SPECTOR

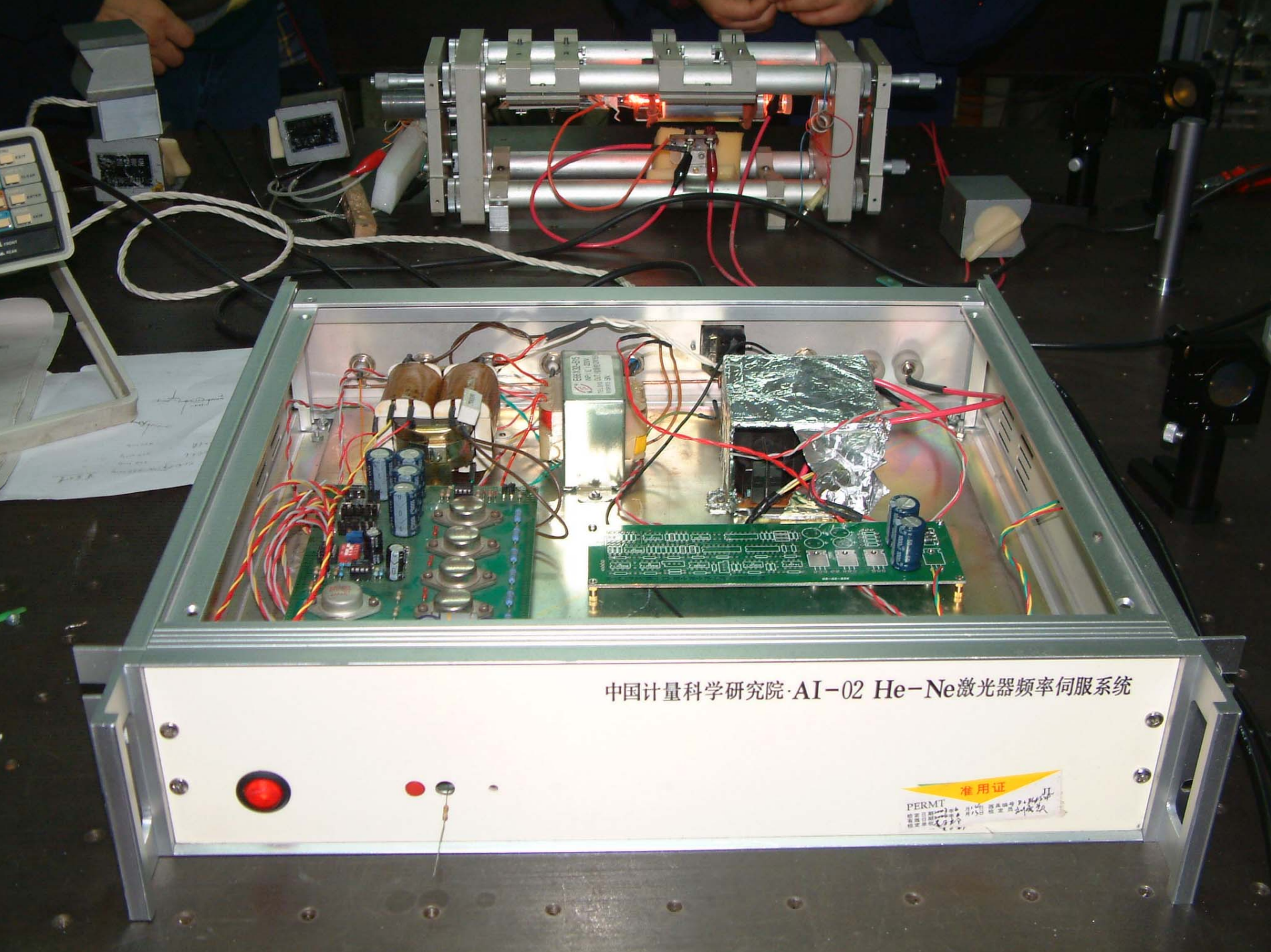
SOURCE OF IONIZATION

633nm激光波长
检定/校准实验室

中国计量科学研究院·A1-03·激光频率伺服系统

中国计量科学研究院·AL-01 He-Ne激光器频率伺服系统

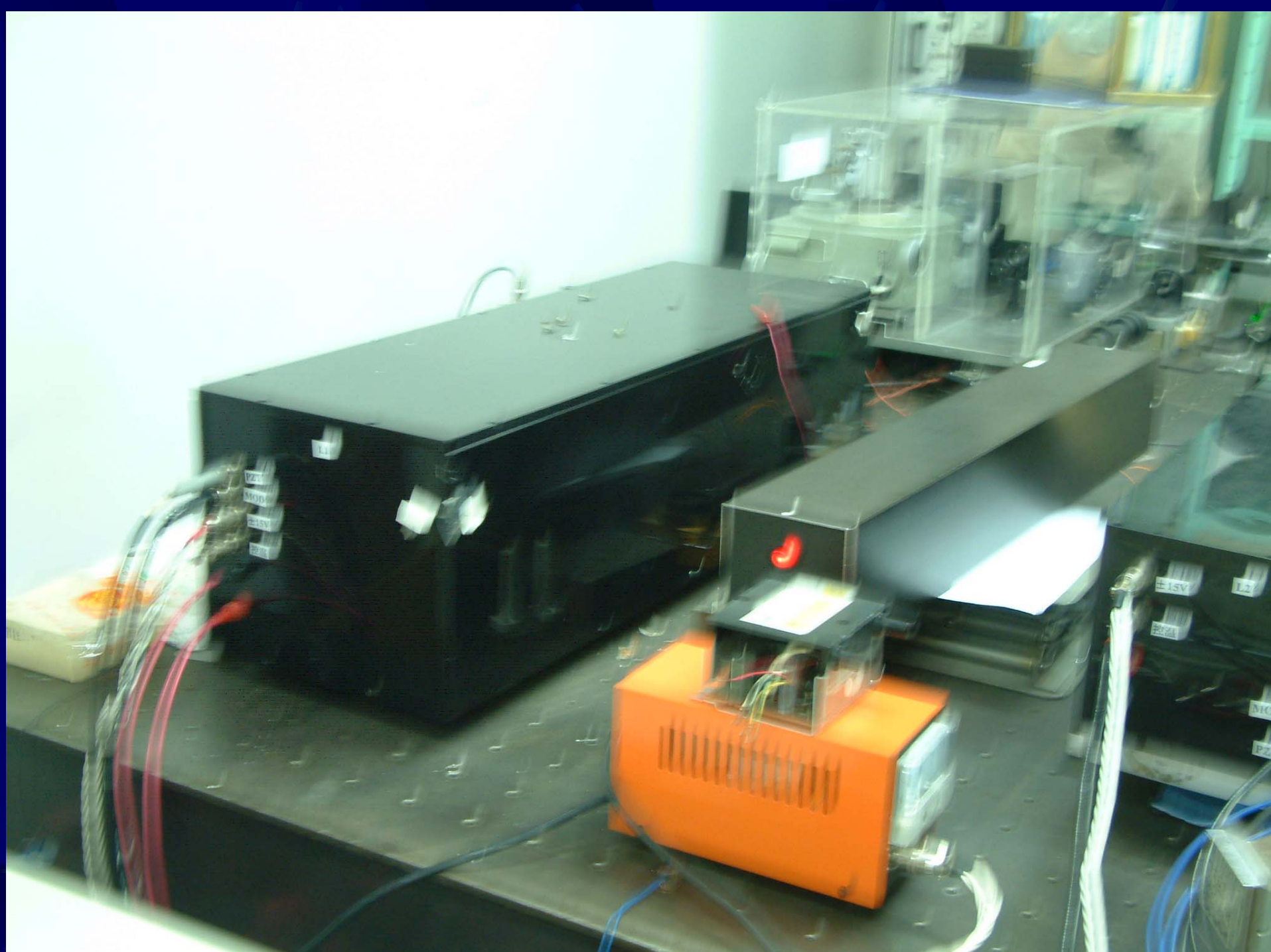




中国计量科学研究院·AI-02 He-Ne激光器频率伺服系统



准用证
PERMT
计量器具准用证
编号: 01-001-001
有效期至: 2010年12月31日
检定日期: 2008年12月31日
检定人员: 刘成斌



International Gravitational Wave Detection Community



LISA interferometer, with 5,000,000km in space

Pre-Fragrant Hill Science Workshop

April 24-28

Relativity and Gravitational Wave

- Shington Yau: many GW problems unsolved

Fragrant Hill Science Conference August 2-3

Frontier of Mathematics and Physics

Yau:

GW detections: very important

- Ask young scientists to participate GW study
- Ask central gov. support
- organizing a contacting group

Fragrant Hill Science Conference Sept 26-28

100 Anniversary of Einstein's Special
Relativity

- We need a special FHS conference for
gravitational wave study and detection

We are planning to
organize a special Fragrant
Hill Science Conference
for GW in China

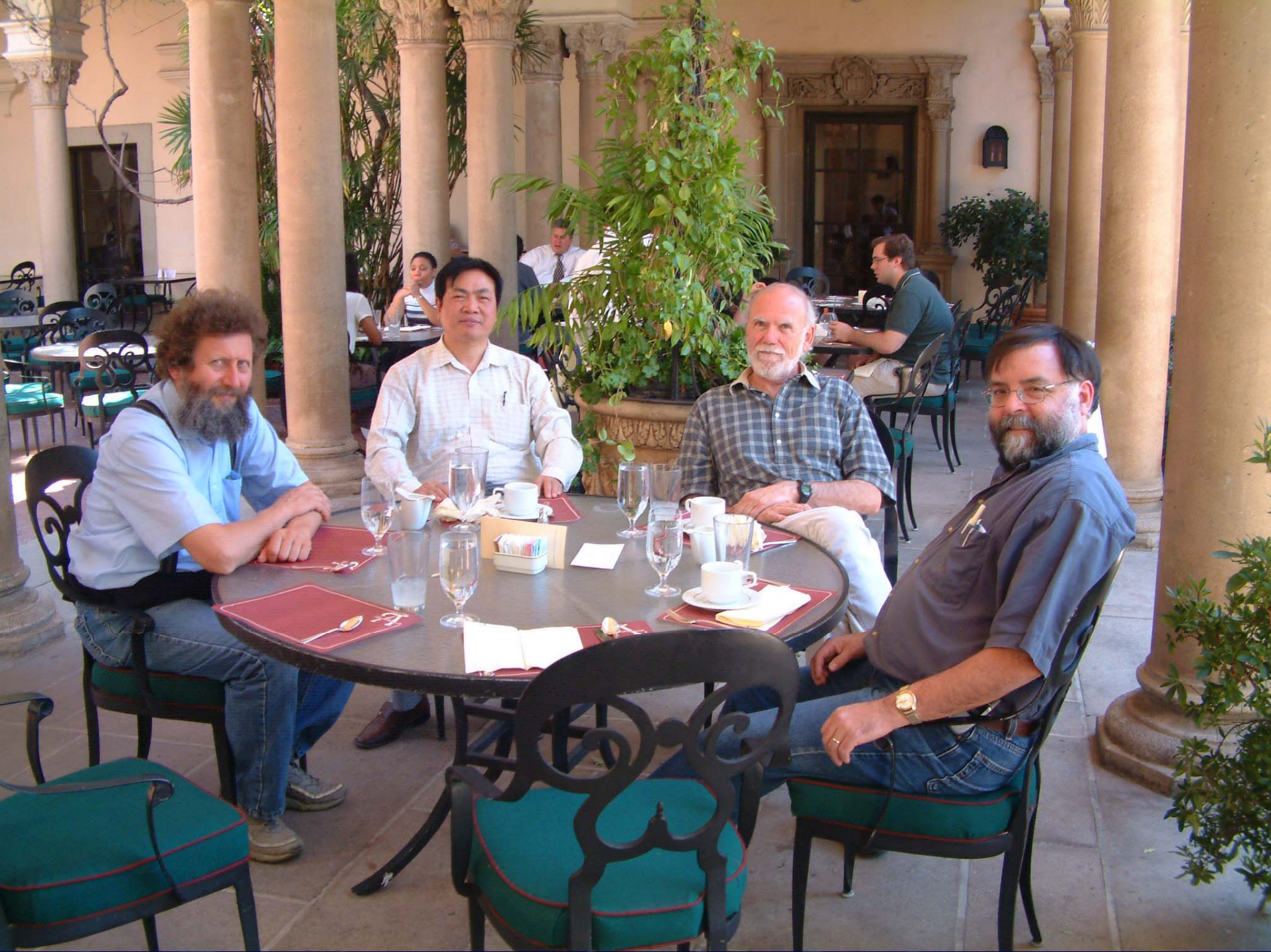
What is the best dates?

Tentative program

- First stage: Training, organizing and designing test interferometer
- Seek second approval
- Second stage: construction of test interferometer, design of full size facility
- Seek final approval
- Third stage: facility construction



Possible site for the Beijing (~ 100 m) prototype















Welcome you go to
Beijing for Fragrant Hill
Science Conference !

Summary

- CEGO initiative for a GW detection facility
- Fully Open to international collaboration
- CEGO needs support from International community to start with a good first step
- We are planning to have a Special FHS conference in coming spring.

Thank You



Thank you!