How ICUIL was born ? The OECD meeting...

The Tenth Meeting of the OECD Global Science Forum 5-6 February 2004
Final Report of the OECD Global Science Forum Coordinating Committee on Compact High-Intensity Short-Pulse Lasers

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Summary

This activity was started from a proposal to organize a workshop for discussion on international cooperation on development and applications of compact, ultrahigh power lasers at the Second Meeting of the OECD GSF in January 2000 by Dr. Yukio Sato of Japan. Approval by GSF, this workshop was held as the "OECD Global Science Forum Workshop on Compact High-Intensity Short-Pulse Lasers: Future Directions and Applications" in Kyoto, 28-30 May 2001.

After this Workshop, the OECD GSF Coordinating Committee on Compact High-Intensity Short-Pulse Lasers was established at the Sixth Meeting of GSF in January 2002 in order to determine the coordination mechanism to strengthen the community for international co-operative activities. During these two years, this committee has organized "A Workshop on Technological Bottlenecks in Compact High-Intensity Short Pulse Lasers", 1-4 April 2003 in Paris. With the support of Dr. J. Osborne, GSF Chair, the committee has made a proposal to IUPAP to establish a committee to promote the international collaboration in the development of ultrahigh intensity lasers and their applications. This proposal was accepted and the IUPAP Working Group: the International Committee on Compact, Ultrahigh Intensity Lasers (ICUIL) has been established in October 2003.

Through these activities, following outcomes have been obtained. These outcomes could not have been achieved so efficiently without the strong support of the Global Science Forum.

- A very good opportunity was provided to scientists and policy makers to seriously consider the present and future of the compact ultrahigh intensity lasers at the Workshop held in Kyoto, which was coupled with the visit to the 100 TW Ti:sapphire laser facility at the Advanced Photon Research Center of JAERI.
- The formal report of this workshop, "Final Report from the Workshop" published by OECD in 2002, has given clear recommendations to the policy makers for the systematic support for laser development and applications and to the scientific community to take a more systematic approach to seek a stronger unity and sense of identity of the community on a global scale.
- Various projects to develop compact ultrahigh-intensity short-pulse lasers and research networks for efficient use of these facilities have been

started recently in Europe, North America and Asia. This GSF activity might have had indirect effect to these projects.
- The coordination mechanism for the systematic organization of the international community has been realized as the IUPAP Working Group: ICUIL. The scope of ICUIL has been expanded by including the representatives from the user communities, other related fields to strengthen synergy especially with the accelerator-based FELs, and the developing countries.

To summarize, various infra-structures for the high field science have been prepared during the 4 years of this activity such as the facilities and research networks on compact, high intensity lasers and the long term framework for international cooperation. Although the ideal structure for the international cooperation has not been yet quite established, it is expected that this field will make advancement in developing the frontier of science and the real world applications with the best use of these infra-structures.

Detailed Report

1. Activities of the OECD Global Science Forum Coordinating Committee on Compact High-Intensity Short-Pulse Lasers

- At the Second Meeting of the OECD GSF (January 2000), "A Proposal to the OECD GSF on Development and Application of Compact Ultrahigh Power Lasers" was made by Dr. Yukio Sato of Japan. This proposal, which was supported by the French delegation, was advised by GSF to be presented again with more clear objectives at the Third Meeting of GSF.
- At the Third Meeting of GSF (June 2000), the revised proposal "A Proposal for a OECD GSF Workshop on International Cooperation in Ultrashort-Pulse, High Power Lasers" made by Y. Sato of Japan has been approved by GSF, with the condition that an international steering committee should be formed for preparation of this workshop.
- The First Meeting of the Steering Committee for the OECD Global Science Forum Workshop on Compact High-Intensity Short-Pulse Lasers was held on 27 October, 2000 at OECD. The basic plan of the Workshop has been made and Y. Kato of Japan was nominated as the Chair of the Workshop.
- At the Fourth Meeting of GSF (January 2001), "Progress Report on Preparation for the OECD Global Science Forum Workshop on Compact High-Intensity Short-Pulse Lasers" was presented by Y. Kato. It was approved to hold the workshop in 28-31 May, 2001 in Kyoto, Japan.
- "The OECD Global Science Forum Workshop on Compact High-Intensity Short-Pulse Lasers: Future Directions and Applications" was held on 28-30 May, 2001 at JAERI Kansai Research Establishment, Kyoto, Japan. This workshop was attended by 56 government-appointed delegates from 10 OECD member countries and 4 non-member countries and approximately 30 observers.
- The Second Meeting of the Steering Committee was held on 30 May, 2001 at the end of the Workshop to discuss on the future directions of this community.
- At the Fifth Meeting of GSF (June 2001), the result of the workshop was reported by D. Hulin of France, Vice-Chair of the Workshop. The follow-up activity has been approved.
- The Report of the Workshop was made available on the OECD home page in October 2001. The printed version of the report "Final Report from the Workshop" was published by OECD in May 2002. This report contains recommendations to the governments and scientists for the need to

promote this emerging promising field.

- The Third Meeting of the Steering Committee was held on 30 November, 2001 in Paris. It was agreed to make a proposal to GSF to establish a Coordinating Committee on Compact High-Intensity Short-Pulse Lasers in order to take steady actions for advancing the science and technology opened with the compact high intensity lasers.
- At the Sixth Meeting of GSF (January 2002), "Proposal to Establish a Global Science Forum Coordinating Committee on Compact High-Intensity Short-Pulse Lasers" presented by Y. Sato has been approved with the 2-year term.
- The First Meeting of the Coordinating Committee was held on 12 April, 2002 at Rutherford Appleton Laboratory, UK. The objectives and activity plans of the Coordinating Committee have been determined. Organization of a Workshop in April 2003 in Paris was approved.
- At the Seventh Meeting of GSF (June 2002), brief account of the First Meeting of the Coordinating Committee was reported by S. Michalowski.
- The Second Meeting of the Coordinating Committee was held on 12-13 December, 2002 at Lawrence Livermore National Laboratory, USA. Organization of an international symposium on ultrahigh intensity lasers was approved. Also it was agreed to make a proposal to IUPAP for establishing a Working Group.
- Proposal was made to the IUPAP Executive Council to establish an IUPAP Working Group: International Committee on Ultrahigh Intensity Lasers (ICUIL) by W. Sandner on 24-25 January 2003 in Trieste, Italy. This proposal was basically approved with the condition to strengthen the synergy with related fields such as the accelerator-based FELs and to include the members from the developing countries.
- At the Eighth Meeting of GSF (January 2003), the activities of the Coordinating Committee was reported by D. Hulin. The report included the prospect to establish the IUPAP Working Group: ICUIL and the plan of the workshop in April 2003 in Paris. The establishment of ICUIL was well received as the success of the OECD GSF.
- "The OECD Global Science Forum Workshop on Technological Bottlenecks in Compact High-Intensity Short Pulse Lasers" (The First Workshop on Technological Bottlenecks in CHISP lasers focused on the multi-terawatt Titanium doped sapphire lasers development) was held in 1-4 April, 2003 in Paris with the support of LOA, France. This workshop was attended by 110 participants, approximately half from research organizations and half from industry. Active information exchanges on technological bottlenecks for development of future high performance lasers were taken between laboratories and industry.
- The Third Meeting of the Coordinating Committee was held on 4 April, 2003 at LOA. It was agreed to organize an International Symposium on Ultrahigh Intensity Lasers: Development, Science and Emerging Applications" in Autumn of 2004 in California.
- At the Ninth Meeting of GSF (30 June-1 July, 2003), the progress of the Coordinating Committee was reported by Y. Sato. The report included the result of the Workshop in April, the detailed account of ICUIL proposal, and the proposal for training highly qualified manpower in intense femto-second laser technology. The manpower training. The importance of the manpower training was supported by GSF.
- A formal letter was sent from J. Boright, GSF Chair to Y. Petroff, IUPAP President to propose establishing ICUIL as the IUPAP Working Group in

July, 2003.
- The Fourth Meeting of the Coordinating Committee was held on26-27 October, 2003 in Quebec. The detailed account of ICUIL such as the membership and the charter, and the action plans some of which have been planned at the Coordinating Committee have been determined.
- At the IUPAP Executive Council Meeting on 10 October, 2003 in Vancouver, Canada, "Proposal to establish an IUPAP Working Group: International Committee on Ultrahigh Intensity Lasers (ICUIL)" presented by Chris Barty was approved.
- The ICUIL has officially started in October 2003 by nomination of the committee members by IUPAP. The kick-off meeting of ICUIL will take place on 7 February 2004 at Rutherford Appleton Laboratory.

2. Major Outcomes

At the OECD Global Science Forum Workshop on Compact High-Intensity Short-Pulse Lasers: Future Directions and Applications held in Kyoto, the following general conclusions were obtained, as described in the Report of the Workshop

For governments:

- Systematic support is needed for laser development and applications.
- Large-scale facilities offer advantages at the highest laser performance levels.

For the scientific community:

- Co-ordination mechanism in the community should be strengthened.

These recommendations have been implemented at least partly in the scientific policies and formation of the research networks as described below.

- **Start of new projects on high intensity lasers**
  In these 1-2 years, new projects have been started or proposed on high intensity lasers at several countries as listed below. Although these are independent from this GSF activity, the workshops and the reports organized by OECD GSF might have given indirect effect to promote the high field science which is the major scope of these projects.
  Canada: ALLS (Advanced Laser Light Source)
  Korea: PW laser project at Advanced Photon Research Institute, K-JIST
  EU: Laser Laboratory Europe
  USA: SAUUL (Science and Applications of Ultra-intense Lasers) (Proposed)
- **Establishment of ICUIL**
  The IUPAP Working Group: International Committee on Ultrahigh Intensity Lasers (ICUIL) has been established as a coordination mechanism to seek a stronger unity and sense of identity of this community as recommended by the Workshop Report. With added participations of the user community, the related fields such as x-ray FELs, and the developing countries, the high field science will be developed under the broader scope.

Future directions

- Under ICUIL, several activities planned during the Coordinating Committee will be implemented, such as the First International Symposium on Ultrahigh Intensity Lasers: Development, Science and Emerging Applications" in Autumn of 2004 in California, and the First Workshop on Specification of High-Intensity Short-Pulse Lasers collocated

at the above symposium.
- At ICUIL, there will be active interactions between the laser community and the accelerator community for development of the ultrashort pulse x-ray and gamma-ray sources for material science, biological research and nuclear and high energy physics research.
- The Asian community is preparing to propose a Panel under ICUIL: the Asian Laser Network on High Intensity Laser Science, in order to promote interactions among the Asian countries which show significant progress recently in science and technology. When linked to the networks in Europe and North America, the scientific activities could be pursued on a global scale by participation of the international community.
- For several years, these activities will be pursued on the scientific bases. When important proposal arises requiring the international participation, these activities will be brought back to the OECD Global Science Forum for consideration of the policy makers.

Members of the OECD Global Science Forum Coordinating Committee on Compact High-Intensity Short-Pulse Lasers (January 2002-January 2004)

Chair	Y. Kato	JAERI, Japan
Vice-Chair	D. Hulin LOA	France
	T. Ditmire	LLNL, USA
	H. Hutchinson	RAL, UK
	S. Michalowski	OECD
	G. A. Mourou	CUOS Univ. Michigan, USA
	C. H. Nam	KAIST, Korea
	W. Sandner	MBI, Germany
	S. Svanberg/C.-G. Wahlstrom	Univ. Lund, Sweden

Members of IUPAP Working Group: International Committee on Ultrahigh Intensity Lasers (ICUIL) (October 2003-October 2006)

Chair	Y. Kato	JAERI, Japan
Vice-Chair	D. Hulin LOA	France
	C. P. J. Barty	LLNL, USA
	S. L Chin Univ.	Laval, Canada
	H. Hutchinson	RAL, UK
	S. Michalowski	OECD
	G. A. Mourou	CUOS Univ. Michigan, USA
	C. H. Nam	KAIST, Korea
	W. Sandner	MBI, Germany
	C.-G. Wahlstrom	Univ. Lund, Sweden
	J. Zhang Inst.	Physics, China