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14. ABSTRACT This report results from a contract tasking BohnLaser Consult as follows: US Air Force has a very important interest in the research on chemical oxygen iodine lasers. The anticipated tasks for this effort are as follows: 1. Organization of the COIL R&D Workshop in Stuttgart for Fall 2009. 2. A final report summarizing the results of these activities. The Workshop is to be held at the International Community Center (Internationales Begegnungszentrum, IBZ) of the University of Stuttgart, a facility to which this proposer has free access. This location, formerly the home of the German scientist and space pioneer Eugen Saenger, holds 30 to 40 people and provides the necessary conference infrastructure including catering facilities. Separate rooms for private negotiations are available, if necessary. The Telekom hotel which offers inexpensive accommodations is situated within walking distance. Organizational activities will include developing a list of topics to be discussed during the workshop, developing a list of potential speakers, contacting these speakers and soliciting abstracts from them, coordinating with EOARD and AFRL with on dates for the Workshop, generating a list of attendees, distributing a general announcement to the list of attendees, reserving the conference center, coordinating catering for the Workshop, coordinating social events for the workshop, and hosting the workshop.						
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Final Report on COIL R & D Workshop

Contract FA8655-09-1-3024

13-14 October 2009
Stuttgart

Executive Summary

The COIL Workshop was attended by 25 participants from 7 countries:

China 2	Russia 2
Czech Republic 4	UK 1
Israel 2	USA 9
Germany 5	

In 2 days 15 oral presentations were given with 12 contributions related to COIL and 3 contributions dealing with EOIL (the electric oxygen iodine laser).

The most outstanding feature of this workshop was the participation of 2 representatives from the Dalian Institute of Chemical Physics (DICP), China. Unique insights into the Chinese COIL Research and related Optics were given.

The US scientists provided a comprehensive overview of the laser activities of the Directed Energy Directorate of the AFRL with special emphasis on recent COIL efforts. Extensive COIL modeling and simulation as well as diagnostic investigations were presented. A special highlight has been the presentation of the Extended User Evaluation related to the Advanced Tactical Laser which also included a video. Current efforts in pressure recovery were also presented and widely discussed among the participants.

The Group from the Czech Republic showed novel aspects in oxygen and iodine generators. Hereby the centrifugal spray type singlet oxygen generator was of particular interest. Besides the chemical generation of molecular iodine the group has extended its research to the production of either iodine or singlet oxygen in electric discharges which leads to the field of EOIL.

The Stuttgart group from DLR presented the latest work in laser resonators aimed at high beam quality for COIL using a hybrid unstable/stable optical cavity in order to match the optical criteria with the flow geometry of the laser. In addition a short overview was given of the newly installed laser test range at the Lampoldhausen site.

The Ben-Gurion University group concentrated on modeling of lasing with unstable resonators and iodine dissociation in supersonic COIL which was still a subject of intense discussion among the participants.

The Russian participants (Lebedev Moscow and Samara) presented results from generation of singlet oxygen and iodine in electric discharges (glow or RF).

Finally the workshop ended with an animated discussion on major technical COIL issues and the perspective of the chemical laser in front of the tremendous progress achieved by solid-state and fiber lasers in recent years.

**COIL R & D Workshop
Stuttgart
13 – 14 October 2009**

List of participants

Name	Institute/Company	E-mail address
CHINA Yuqi Jin Long Sun	DICP, Dalian DICP, Dalian	hxm@dicp.ac.cn optics@dicp.ac.cn
CZECH REPUBLIC Vít Jirásek Jarmila Kodymová Josef Schmiedberger Otomar Špalek	Inst. of Physics, Prague Inst. of Physics, Prague Inst. of Physics, Prague Inst. of Physics, Prague	jirasek@fzu.cz kodym@fzu.cz schmiedb@fzu.cz spaleko@fzu.cz
ISRAEL Boris Barmashenko Zamik Rosenwaks	BGU, Beer-Sheva BGU, Beer-Sheva	barmash@bgu.ac.il zamik@bgu.ac.il
RUSSIA Andrey Ionin Paul Mykheyev	Lebedev PI, RAS, Moscow Lebedev PI, RAS, Moscow	aion@sci.lebedev.ru mykheyev@fian.smr.ru

UK Tom Gavrielides	EOARD, London	tom.gavrielides@london.af.mil
USA Harro Ackermann Wallace Clark Timothy Madden Jason Marshall Carrie Noren Ted Ortiz Susan Thornton Keith Truesdell Robert Walter	JTO, Albuquerque AFRL, Albuquerque AFRL, Albuquerque AFRL, Albuquerque AFRL, Albuquerque AFRL, Albuquerque AFRL, Albuquerque ABL, Albuquerque Schafer Corp., Albuquerque	harro.ackermann@JTO.HPC.MIL wallace.clark@kirtland.af.mil timothy.madden@kirtland.af.mil jason.marshall@kirtland.af.mil carrie.noren@kirtland.af.mil ted.ortiz@kirtland.af.mil susan.thornton@kirtland.af.mil keith.truesdella@kirtland.af.mil bwalter@schaferalb.com
GERMANY Willy Bohn Frank Duschek Adolf Giesen Juergen Handke Carsten Pargmann	BohnLaser Consult, Stuttgart DLR, Lampoldshausen DLR, Stuttgart DLR, Lampoldshausen DLR, Lampoldshausen	willy.bohn@bolaser.de frank.duschek@dlr.de adolf.giesen@dlr.de juergen.handke@dlr.de carsten.pargmann@dlr.de

Tuesday, 13 Oct 2009

09:00 Registration

09:20 Welcome Address

Session I Chair: Susan Thornton

09:30 COIL Research Activities in DICP

Yuqi Jin, Xinmin Han, Fengting Sang, Dalian Institute of Chemical Physics (DICP), CAS

10:00 Recent Gas Laser Activities at AFRL, a General Overview

Timothy Madden, Directed Energy Directorate, Air Force Research Laboratory

10:45 Break

Session II Chair: Andrey Ionin

11:15 Review of COIL Research Activities at the Institute of Physics, Prague

Jarmila Kodymová, Institute of Physics, AS, Prague

11:45 Research on Centrifugal Spray Singlet Oxygen Generator for a COIL

O. Špalek, V. Jirásek, J. Hrubý, M. Čenský, J. Kodymová, Institute of Physics, AS, Prague

12:15 An Investigation of a Gas Laser Pressure Recovery System Diffuser

Carrie Noren, Theodore Ortiz, Michael Wilkinson, & Timothy Madden
Directed Energy Directorate, Air Force Research Laboratory

Wade Klennert, Boeing LTS, Albuquerque, NM

Richard Chan & H. Wilhelm Behrens, Northrop Grumman Space
Technology, Redondo Beach, CA

Robert Walter, Schafer Corporation, Albuquerque, NM

Robert Decker, USAFA, Colorado Springs, CO

12:45 **Lunch**

Session III Chair: Yuki Jin

14:00 **R&D of Optics in COIL**

Long Sun, Gang Li, Wanfa Liu, Dalian Institute of Chemical
Physics (DICP), CAS

14:30 **Modified Negative-Branch Unstable Resonator in Different
Configurations**

Carsten Pargmann, Thomas Hall, Jürgen Handke, DLR Institute of
Technical Physics, Stuttgart

15:00 Depart for Porsche Museum

16:30 Guided visit of the Porsche Museum

18:00 Informal Get Together

Wednesday, 14 Oct 2009

Session IV Chair: Jarmila Kodymová

09:00 Chemical Generation of Molecular Iodine for a COIL

V. Jirásek, M. Čenský, O. Špalek, J. Kodymová, Institute of Physics, AS, Prague

09:30 I₂ Dissociation in Supersonic Chemical Oxygen-Iodine Lasers: Recent Kinetic-Fluid Dynamics Modeling"

K. Waichman, B.D. Barmashenko and S. Rosenwaks, Department of Physics, Ben-Gurion University of the Negev, Beer Sheva

10:00 Singlet Delta Oxygen Generator with a Slab Transverse Gas Flow RF Discharge for DOIL

A.Ionin, Yu.Klimachev, I.Kochetov, A.Napartovich, O.Rulev, D.Sinitsyn, and L.Seleznev, Lebedev Physical Institute, Moscow

10:30 Break

Session V Chair: Wally Clark

11:00 Modeling of Lasing in Chemical Oxygen-Iodine Lasers with Unstable Resonators

B.D. Barmashenko, Department of Physics, Ben-Gurion University of the Negev, Beer-Sheva

11:30 RF Discharge Dissociation of Various Iodine Donors for a COIL/DOIL

V. Jirásek, J. Schmiedberger, M. Čenský, J. Kodymová, Institute of Physics, AS, Prague

12:00 Latest Development of Hybrid DC/RF Plasma Jet Generator of O₂(¹Δ) for a DOIL

J. Schmiedberger, K. Rohlena, V. Jirásek, M. Čenský, J. Kodymová, J. Gregor, P. Křenek, M. Hrabovský, Institute of Physics, AS, Prague

12:30 Lunch

14:00 Iodine Generation in a Glow Discharge

P. A. Mikheyev, V. N. Azyazov, Lebedev, Physical Institute, Samara Branch, Samara

15:00 Post Deadline Presentation:

First year of DLR-test range at Lampoldshausen

Jürgen Handke, Karin Grünewald, DLR Institute of Technical Physics,
Stuttgart

Round Table

End of Workshop

16:00 Discussion Groups

18:30 Dinner at Restaurant "Klösterle", Stuttgart Bad Cannstatt

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