LSSE <Online (Zoom_LSSE)>

Monday, 18 April

[LSSE1] 10:00-12:05
Industrial applications 1
Chair: Toshikazu Ebisuzaki
RIKEN

LSSE-Opening 10:00

Opening Remarks

LSSE1-01 10:05 *Keynote*

Radiotherapy Application of High-Density Laser Wakefield Acceleration

Toshiki Tajima[1], Dante E. Roa[2]
[1]Department of Physics and Astronomy, Univercity of California, Irvine, [2]Department of Radiation Oncology, University of California, Irvine

Laser wakefield acceleration (LWFA) is capable of accelerating electrons over a compact distance. The recent development of the high density (HD) regime of LWFA allows the relatively low energy electron acceleration over a microscopic distance with higher efficiency. We will present the application to radiotherapy of the laser wake field acceleration.

LSSE1-02 11:05 *Invited*

Production and Applications of Radioisotopes at RIKEN RI Beam Factory - Search for New Elements through Diagnosis and Therapy of Cancer -

Hiromitsu Haba
Nishina Center for Accelerator-Based Science, RIKEN

At RIKEN RI Beam Factory (RIBF), Wako, Japan, we have been developing production technologies of radioisotopes (RIs) over the entire area of the periodic table and conducting RI application studies in the fields of physics, chemistry, biology, engineering, medicine, pharmaceutical and environmental sciences. In this conference, production and applications of RIKEN RIs especially for new element chemistry and targeted alpha-particle therapy will be introduced.

LSSE1-03 11:35 *Invited*

Recent activities of Advanced Science Research Center of JAEA for industrial and educational applications

Hiroyuki Koura
Japan Atomic Energy Agency

Advanced Science Research Center of JAEA outcomes some industrial and educational applications not only for fundamental sciences related to atomic energy researches. Extraction process is efficiently advanced by emulsion flow, which makes the first JAEA venture company established in 2021. The JAEA nuclear chart expands to educational usage. A crowdfunding for distribution of it to super-science high-school overall Japan was authorized in 2020.

[LSSE2] 13:00-14:50
Industrial applications 2
Chair: Takashi Fujii
The University of Tokyo

LSSE2-01 13:00 *Keynote*

Remote Technology for Decommissioning of Fukushima Daiichi Nuclear Power Station

Hajime Asama
The University of Tokyo

In this presentation, the robotic devices and systems which have been developed and utilized for decommissioning of Fukushima Daiichi Nuclear Power Station are introduced, and the robotics technology that will be required to promote decommissioning in the future is presented.

LSSE2-02 14:00 *Invited*

The high-speed scanning and high-power density CW fiber laser decontamination and cleaning system for nuclear industries

Eisuke John Minehara[1], Akihiko Nishimura[2], Atsushi Kosuge[2], Koichi Saruta[2]
[1]Laser Decontamination and Decommissioning Corporation(LDD), [2]Japan Atomic Energy Agency(JAEA)

We have independently developed the laser decontamination and cleaning system consisting of a diffraction-limited single-mode CW fiber laser and a high-speed galvanometer for nuclear industries. The RI contaminants and rust of various oxides in the stainless and carbon steel, and inorganic and organic materials were instantly evaporated with the high-power density and high-speed scanning laser light, and to decontaminate below the detection limit.

LSSE2-03 14:30

Remote Laser Heating Experiments using a 10kW Fiber Laser with the Robot System

Akihiko Nishimura[1,2]
[1]JAEA, [2]Univ. Fukui

A 10 kW fiber laser is used for heating a SUS vessel. Safety operation is completely garanteed, which can promote R&D for heat resistant FBG sensing.

Tuesday, 19 April

[LSSE3] 10:00-12:00
Anti-COVID-19
Chair: Toshikazu Ebisuzaki
RIKEN

LSSE3-01 10:00 *Keynote*

COVID-19 AI & Simulation Project: Project overview and lessons learned

Hiroaki Kitano
Sony Computer Science Laboratories, Inc.

COVID-19 AI & Simulation Project is a project under the Cabinet Secretariat of the Japanese Government initiated to take proper counter-measures using broad range of technologies including AI & complex systems simulation. This talk provides overview of the project, highlights some of success and failures, and lessons learned for future actions.

LSSE3-02 11:00 *Keynote*

Inactivation of Coronavirus (SARS-CoV-2) by Deep Ultraviolet Irradiation

Satoshi Wada
RIKEN

I will introduce our efforts to visualize airborne droplets and inactivate viruses in space, especially using an optical technique, for the purpose of realizing a safe and secure space by a physical method.

[LSSE4] 13:00-14:20
Industrial applications 3
Chair: Satoshi Wada
RIKEN

LSSE4-01 13:00 *Invited*

The Environmental Island, GREEN FLOAT

Akane Takahashi
SHIMIZU Corporation

Shimizu Corporation announced in 2008 a floating city with a diameter of 3km called "Environmental Island GREEN FLOAT". The floating city has many advantages and we believe that the day of realization is near.

LSSE4-02 13:30 *Invited*

Specific expression of isoflavone biosynthesis genes in Soybean root development.

Hidefumi Hamasaki[1], Yukio Kurihara[1], Tomoko Kuriyama[1], Toyoaki Anai[2], Haruko Takeyama[3], Minami Matsui[1]
[1]RIKEN CSRS, [2]Kyusyu University, [3]Waseda University

Isoflavones synthesized in soybean roots play a key role in rhizosphere bacterial communities to support plant growth. We examined their expression under various intercrop soil conditions.

LSSE4-03 14:00

Magnetic Levitation Propulsion System Using Rotating Permanent Magnets

Kazumasa Ino, Taku Saiki, Mitsuru Inada
Kansai University

Axial-flux motor with Fe nano-polycrystalline body was developed for use in magnetic levitation system. Driving power of motor and minimum thickness of metal plate in magnetic levitation system was clarified.

[LSSE5] 15:30-17:10
Industrial applications 4
Chair: Akihiko Nishimura
Japan Atomic Energy Agency

LSSE5-01 15:30 *Invited*

Resonance scattering lidar observations of the upper atmosphere in Antarctic

Mitsumu K. Ejiri[1,2], Takuji Nakamura[1,2], Takanori Nishiyama[1,2], Takuo T. Tsuda[3], Katsuhiko Tsuno[4], Makoto Abo[5], Takuya D. Kawahara[6], Takayo Ogawa[4], Satoshi Wada[4]
[1]National Institute of Polar Research, [2]The Graduate University for Advanced Studies, SOKENDAI, [3]The University of Electro-Communications, [4]RIKEN,RAP, [5]Tokyo Metropolitan University, [6]Shinshu University

Overview of the resonance scattering lidar observations of the middle and upper atmosphere will be presented, as well as details of our observation conducted as a part of the Japanese Antarctic Research Expedition project at Syowa Station.

LSSE5-02 16:00 *Invited*

Laser remote analysis for decommissioning of Fukushima Daiichi Nuclear Power Station (1FNPS) and its application in the actual site

Ikuo Wakaida[1], Hironori Ohba[1,2], Ryuzo Nakanishi[1,2], Katsuaki Akaoka[1], Takuya Shibata[1]
[1]Japan Atomic Energy Agency, [2]National Institutes for Quantum Science and Technology

Remote analysis by optical fiber based Laser Break down Spectroscopy (LIBS) has been successfully performed under a radiation of 10kGy/h and total dose more than MGy, and in the actual site of 1FNPS, collected radioactive samples has been demonstrated to analyzed.

LSSE5-03 16:30

Development of laser-induced breakdown spectroscopy system for on-site diagnostics of composite insulators

Takashi Fujii[1], T Honmma[1], A Kumada[1], H Homma[1], Y Oishi[2]
[1]The University of Tokyo, [2]Central Research Institute of Electric Power Industry

We developed a laser-induced breakdown spectroscopy system for onsite diagnostics of degradation of silicone rubber composite insulators. We demonstrated that the emission signal from plasma was not affected by applied voltage to the insulators.

LSSE5-04 16:50

Development of the Laser Hammering System for Inspection of and Diagnosis of Concrete Structures

Noboru Hasegawa[1], Masaharu Nishikino[1,2], Hajime Okada[1,2], Shuji Kondo[1,2], Toshiyuki Kitamura[1,2], Shigeru Kogure[2], Satoshi Tomoto[3], Hikaru Nakamura[4]
[1]National Institutes for Quantum Science and Technology, [2]Photon-Lab. Co., Ltd., [3]CTI Engineering Co., Ltd., [4]Nagoya Univercity

We are developing and implementing in society a remote non-destructive sensing system for concrete, Laser Hammering System (LHS). Several trial works are already performed, and establishment an operation method for effective utilization is in progress.

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Wednesday, 20 April

[LSSE6] 14:00-15:30
Industrial applications 5
Chair: Takeharu Murakami
RIKEN

LSSE6-01 14:00 ***Invited***

System and Device Optimization of Electrochemical Hydrogen Generation and CO_2 Reduction Reactions with Their Light-Assisted Evaluations

Katsushi Fujii, Katsuhiko Tsuno, Takeharu Murakami, Kei Morishita, Miyuki Nara, Takayo Ogawa, Satoshi Wada
RIKEN

Hydrogen evolution and CO_2 reduction with natural energy are attractive for artificial CO_2 exhaust reduction. The processes are, however, still obscure. Process optimization including light-assisted evaluations is discussed.

LSSE6-02 14:30 ***Invited***

Efforts for a hydrogen-based society

Naoki Uchiyama
ATSUMITEC CO., LTD.

Introducing "hydrogen safety technology," "hydrogen production," "hydrogen storage," "hydrogen utilization," and the content of initiatives for the future society that are necessary to realize a hydrogen society.

LSSE6-03 15:00 ***Invited***

Ultra-high-efficiency photovoltaic for solar hydrogen production and carbon recycling

Masakazu Sugiyama
Research Center for Advanced Science and Technology, The University of Tokyo

A carbon-neutral energy system requires high-efficiency photovoltaic to power uphill electrochemical reactions that are indispensable for a circular material system: water splitting and CO_2 utilization. Multijunction photovoltaic is promising for this purpose.

[LSSE7] 10:00-11:20
Space Technology
Chair: Toshikazu Ebisuzaki
RIKEN

LSSE7-01 10:00 ***Invited***

Development of the Solar-Pumped Laser Systems

Tomomasa Ohkubo[1], Hayato Koshiji[1], Hirozumi Munakata[1], Ei-ichi Matsunaga[1], Yuji Sato[2], Thanh Hung Dinh[3]
[1]Tokyo Univercity of Technology, [2]Joining and Welding Research Institute, Osaka University , [3]National Institutes for Quantum Science and Technology

Solar-pumped laser is one of the expected energy transfer technology for space solar power system. We developed several types of solar-pumped laser systems. The most efficient system realized 120 W of laser power and 30 W/m^2 of total area efficiency.

LSSE7-02 10:30 ***Invited***

Introduction of detumbling result of H2A upper body by ablation generated by pulsed laser onboard small satellite

Tadanori Fukushima[1], Daisuke Hirata[1], Kazuma Adachi[1], Yuki Itaya[1], Jun Yamada[2], Tomoaki Fujihara[2], Aditya Baraskar[2], Katsuhiko Tsuno[3], Takayo Ogawa[3], Yoshiharu Kawai[3], Masayuki Maruyama[3], Satoshi Wada[3], Toshikazu Ebisuzaki[3]
[1]SKY Perfect JSAT, RIKEN, [2]SKY Perfect JSAT, [3]RIKEN

Orbital objects are continuously affected by external forces and their attitude fluctuates. We set the upper stage of H2A as the target object and show the simulation results of the process of stopping the rotation.

LSSE7-03 11:00

Development of Fast Deformable Mirrors: A Control Model using the Influence Function Approach

Gaik Khosrovian[1], Seiji Taniguchi[1], Masayuki Fujita[1], Tomohiro Tsukihana[2], Naoto Sakaki[2], Toshikazu Ebisuzaki[2], Masashi Iwashimizu[3], Takuya Noritake[3], Shingo Nishikata[3], Hiroyuki Daigo[3]
[1]Institute for Laser Technology, [2]RIKEN, [3]Mitsubishi Heavy Industries

Development, characterization, and control of large diameter (10cm) deformable mirrors for high-power lasers, capable of operating at a 10kHz sampling rate are described and verified experimentally.

[LSSE8] 13:00-15:00
Agri-Photonics 1
Chair: Kohsuke Chris Yamada
AOI-PARC

LSSE8-01 13:00 ***Invited***

Single-cell based analysis of environmental microbes

Haruko Takeyama[1,2,3,4], Yohei Nishikawa[2,3], Mako Kifushi[1,2], Masato Kogawa[3], Shumpei Horii[1], Masahiro Ando[3], Masahito Hosokawa[1,2,3,4], Toyoaki Anai[5]
[1]Department of Life Science and Medical Bioscience, Waseda University, [2]Computational Bio Big-Data Open Innovation Laboratory, AIST-Waseda University, [3]Research Organization for Nano & Life Innovation, Waseda University, [4]Institute for Advanced Research of Biosystem Dynamics, Waseda University, [5]Faculty of Agriculture, Kyushu University

We have developed a technique to analyze single-cell microbes' genomic information and metabolites with droplet microfluidics and Raman spectroscopy and adapted it to various environmental samples.

Thursday, 21 April

LSSE8-02 13:30 ***Invited***

Forest trunk biomass estimation by airborne laser scanning

Shizuo Suzuki[1], R. Kato[1], T. Hoshikawa[2]
[1]National Institute of Technology, Numazu College, [2]Shizuoka Professional University of Agriculture

In airborne laser scanning (ALS), surface height data of forest canopy was obtained by the reflection of the laser. The timber volume using the average surface height was compared with the field survey data in Japanese plantation forests, resulting in underestimating Japanese cedar.

LSSE8-03 14:00 ***Invited***

Benefits of smart LED supplemental lighting

Gauri Maharjan
Signify (Formerly Philips Lighting)

Lighting control in greenhouse based on light intensity of the radiation is used widely. We developed a dimmable LED lighting solution for greenhouse which is more efficient way of growing crops. In this report, we introduce some case studies.

LSSE8-04 14:30 ***Invited***

Applications of 2D and 3D Image Processing to Plant Breeding and Precision Agriculture

Shuhei Noaki[1], Kenta Itakura[2]
[1]CULTA Inc., [2]Graduate School of Agricultural and Life Sciences, The University of Tokyo

CULTA Inc. is developing technology for 2D and 3D image processing, which are being applied to phenotyping of plant breeding and precision agriculture. In this presentation, I will introduce our technology and its application examples.

[LSSE9] 15:30-17:15
Agri-Photonics 2
Chair: Norihito Saito
RIKEN

LSSE9-01 15:30 ***Invited***

Isolation and utilization of novel soybean mutants from high-density mutant population

Toyoaki Anai
Kyushu University

This presentation introduces our research to improve soybean using the high-density mutant population. For example, we isolated several fatty acids biosynthesis mutants and successfully developed new cultivars.

LSSE9-02 16:00

An improved Double-Neighborhood Gradient with time-domain Method for flying small-size birds detection

Tzu-Chieh Yu, Yu-Pin Lan
National Yang Ming Chiao Tung University

An effective and real-time method for tracking multiple small targets in a complex environment is proposed. This method can be applied to an automatic bird repelling system.

LSSE9-03 16:20

Effective Birds detection and driving away methods

Zheng Yi Lai[1], Yu-Pin Lan[1], Jung-Cheng Chen[2]
[1]National Yang Ming Chiao Tung University, [2]Syue Jin Elementary School

The study proposes an effective method for finding birds in complex environments, as well as identifying clusters of birds to assist in monitoring wild birds and automatically driving birds away.

LSSE9-04 16:40 ***Invited***

Real-time C_2H_4 monitoring using mid-IR quantum cascade laser spectroscopy

Masaki Yumoto[1], Yasushi Kawata[1], Tetsuya Abe[1,2], Tomoki Matsuyama[1], Satoshi Wada[1]
[1]RIKEN, [2]TOPCON CORPORATION

We have demonstrated real-time monitoring of C_2H_4 concentration changes in gas released from apples by non-destructive and *in-situ* gas sampling in an open environment.

LSSE-Closing 17:10

Closing Remarks