

Suomen fotonikan seura ry:n julkaisu

# Fotoni



Professori emeritus Markus Pessa • Professori emeritus Jari Turunen

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#### Fotoni 1/2023, 21. vuosikerta

**Julkaisija:** Suomen fotonikan seura ry

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#### Tilaukset ja osoitteenmuutokset:

Jäsenetuna Suomen fotonikan seuran jäsenille.  
Vuoden kuluessa liittyvät uudet jäsenet saavat alkuvuoden numeron jäsenetuna niin kauan kuin painos riittää. Osoitteen muutokset suoraan jäsenasioiden hoitajalle, ks. <http://www.photonics.fi>

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# Puheenjohtajan palsta

Arvoisat Suomen fotonikan seuran jäsenet,

Seuran toimisto ja hallitus sai vuoden 2022 toimintakertomuksen koostettua ja tähän voi tutustua mm. verkkosivujemme kautta sääntömääräisen kevätkokouksen kutsussa. Toimintakertomuksesta selviää, että seurallamme oli vuoden 2022 lopussa 111 yritys- ja yhteisöjäsentä. Nousua on siis edelleen tapahtunut yhdentoista yrityksen verran siitä, kun reilu vuosi sitten meni sadan yritys- ja yhteisöjäsenen raja rikki. Henkilöjäsenten määrä on myös ollut merkittävässä nousussa ollen nyt jo yli 300 henkilöjäsentä. Suurin muutos edelliseen vuoteen verrattuna on tapahtunut opiskelijajäsenten määrässä, joka on vuodessa noussut 45:stä 76:een. Tämä on hyvä ottaa huomioon seuran tulevia toimintasuunnitelmia koostaessa.

Toimintakertomus toteaa myös seuran olleen aktiivinen tapahtumien järjestämisessä ja niihin osallistumisessa. Listasta löytyy yli 20 tapahtumaa viime vuodelta, joten verkostoituminen ja tiedon jakaminen ovat olleet hyvin seuran toiminnan keskiössä. Fotonikasta on tiedotettu suurelle yleisölle mm. SuomiAreena -tapahtumassa jo kahtena vuonna, ja tänäkin vuonna SuomiAreenassa on taas fotonikka esillä. SuomiAreena 2023 järjestetään Porissa 27. – 30.6.2023, ja seuramme järjestää yhdessä fotonikan lipupulaiva PREIN:in kanssa fotonikan paneelikeskustelun tapahtumaviikon loppupuolella 30.6.2023 klo 15.00 Kauppakeskus Puuvillassa. Aiheena on tällä kertaa fotonikan rooli puolustus- ja turvallisuusteknologioissa. Siitä on varmasti tulossa mielenkiintoinen keskustelu. Tilaisuuden voi katsoa myös MTV Katsomo -palvelusta suorana tai myöhemmin, jos ei itse pääse paikan päälle.

Viimeisen puolen vuoden ajalta on myös surullista kerrottavaa. Kaksi merkittävän

uran tehnyttä fotonikan professoria on poistunut keskuudestamme Markus Pessa 31.12.2022 ja Jari Turunen 9.5.2023. He molemmat olivat tunnettuja ja vaikuttavia hahmoja Suomen fotonikkayhteisössä ja myös kansainvälisesti. Henkilökohtaisesti opin tuntemaan heidät intohimoisina tieteen tekijöinä ja päättäväisinä oman tienensä kulkijoina. Surun valtaamana muistelen heidän kanssaan viettämiäni hetkiä. Heidän vaikutuksensa Suomen fotonikkaosaamisen kehittämisessä on merkittävä ja heidän tieteellinen perintönsä tulee näkymään yhteisössämme vielä pitkään. Molemmista heistä on luettavissa kollegoiden tekemät kirjoitukset tämän lehden sivuilta.

Vuotuinen päätapahtumamme Optiikan ja Fotonikan Päivät pidetään toukokuun lopussa Joensuussa samoin kuin seuramme kevätkokous, jossa valitaan seuralle uusi hallitus. Oma kauteni seuran hallituksen puheenjohtajana on loppumassa ja haluan kiittää kaikkia seuran toimintaan osallistuneita. Hallitukselle kiitokset aktiivisesta otteesta ja eteenpäin luotaavasta toiminnasta. Erityiskiitokset osoitan seuran toimistotiimille: Juha Purmonen, Ana Gebejes, Caroline Amiot, ja Tuukka Pakarinen. He pitävät seuran rattaat pyörimässä ja ovat tehneet seurastamme vahvan ja vaikutusvaltaisen toimijan. Suuret kiitokset myös Fotonilehden päätoimittajalle Jouko Korppi-Tommolalle kaksi kertaa vuodessa ilmestyvästä erinomaisesta lukupaketista ja katsauksesta seuramme toimintaan ja tapahtumiin.

Toivotan kaikille hyvää kesää ja valoisaa tulevaisuutta fotonikan parissa!

Tampereella 20.05.2023

**Juha Toivonen**

# Päätoimittajalta

Kustavissa 19.05.2023  
Jouko Korppi-Tommola



Hyvä FOTONI:n lukija

Tämän numeron sanoma keskittyy kahden suomalaisen fotonikan pioneerin professori **Markus Pessan** ja professori **Jari Turusen** elämäntyön esittelyyn. Olen syvästi vaikuttunut näiden kahden lahjakkaan ja persoonallisen tutkijan saavutuksista, molempien omalla sektorillaan, Markuksen tieteen eturintamassa kulkevalla kokeellisella työllään yhdistepuolijohdeiden valmistamiseksi ja soveltamiseksi yritystoiminnan käynnistämiseen ja Jarin uskomattoman intuitiivisella ja ennätysellisellä vauhdilla julkaisukuntoon saatulla teoriaosaamisellaan. Kumpikin heistä oli Suomen fotonikan nykyosaamisen syntymisen peruspilareita ja laajasti ansiotuneita tutkimusryhmiensä vetäjiä, Markus mm. Suomalaisen Tiedeakatemian tiedepalkinnon saajana ja Jari mm. Suomen Akatemian tutkimusprofessorina. Markuksen vaikutuksesta Tampereen seudulle on syntynyt hänen monivuotisen työnsä tuloksena yli 250 fotonikan ammattilaisen ja kuuden spin-off yrityksen keskittymä, alalle, joka on mitä suurimmassa määrin

kilpailtu ja Euroopan mitassa fokusoitu tulevaisuuden innovaatiokenttänä ja johon myös investoinnein on varauduttu. Itse hankkiessani vasta markkinoille ilmestynyttä femtosekuntispektrometriä laboratorioon Jyväskylässä 90-luvun alussa, valintapäätökseni perustui siihen, että laitteiston pumppaukseen käytettävät diodilaserit olivat alumiinivapaita. Kävi ilmi, että diodit oli valmistettu Tampereella, silloisen Coherent Finland Oy yrityksen, siis Markuksen vaikutuksesta jo siinä vaiheessa perustetun yrityksen, toimesta. Jarin persoonallinen ja tukeva ote oppilaittensa ohjauksessa ja pitäytyminen paljolti julkisuudesta sivussa korosti hänen tapaansa tehdä mikro- ja diffraktiiviseen optikkaan perustuvaa teoria- tutkimusta. Hän vaikutti myös oppilaisiinsa vetoavasti omalla omintakeisella tavalla, rakentamalla omin käsin ja pieteetillä käsitteeksi tulleen keskiaikaisen linnansa Kontiolahdelle. Muistan kun erään karonkan päättäjäisjuhliissa hotelli Kimmelissä kuulin, että linnaan mentäisiin sitten aamuyöstä pyöreän pöydän ääreen, sillä kertaa oma jaksamiseni ei siihen riittänyt.

Akateeminen maailma tarvitsee Markuksen ja Jarin kaltaisia alojensa persoonia, huippuosaajia, sekä heidän karismaattisia ja puoleensa vetäviä henkilökohtaisia ominaisuuksiaan, joiden kautta uusien sukupolvien oppilaat hakeutuvat tutkimusryhmiin ohjattavaksi.

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En malta olla tuomatta esiin väistyvän pääministerimme **Sanna Marinin** upeaa puhetta 18 toukokuuta 2023 vihittyjen New Yorkin yliopiston kunniatohtoreiden puolesta, 13000 yliopistosta valmistuneen ja 26000 omaisen ja yliopiston henkilökunnan muodostamalle yleisölle Yankee stadionilla. Kääntäisin hänen kolme, vasta valmistuneille viestittämänsä teemaa käänteiseen järjestykseen viestinä tämän lehden nuorimmalle lukijakunnalle. Siis älä pelkää Maxwellin yhtälöitä ne Maxwell kirjoitti jo 1861 ja sen jälkeen niiden sisältöä on opetettu tuhansille. Sinun vain on tartuttava niiden salaisuuksien kertomaan, koska kukaan muu ei sitä puolestasi voi tehdä. Mikäli kurssilla salaisuus jäi

pimentoon, sinun on vaadittava muutosta, ei täyttämällä turhauttava ja sinulle hyödytön kurssipalaute, vaan menemällä opettajan luo kertomaan hänelle, että en tästä selviä yksin. Yhdessä selvittää, päätti Marin puheensa ja onnitteli valmistuneita. Olisiko puhe voinut olla ajankohdaisempi nykymeron akateemiselle opetukselle?

Olen myös kiitollinen professori **Zhipei Sun:**lle kirjoituksesta, jossa hän esittelee ryhmänsä tutkimustyötä. Heidän valmistamastaan mikrometriä kokoisesta spektrometristä, Science lehdessä julkaistusta artikkelistaan luin ensimmäisen kerran Nature lehden tiede uutis sivustoilta. Vanhan spektroskopiakonkarin mieltä lämmitti utopistiselta tuntuva saavutus.

Vielä toimituksen harmitus. Unohdimme vuonna 2022 fotonikkayrityksenä palkitun Dispelix Oy:n toimintaa kuvaavan ja FOTONI 2\_2022 numerossa ilmestyneen artikkelin kirjoittajan nimen kirjoituksen lopusta. Mielenkiintoisen ja lentävän tekstin kirjoitti Dispelix:in **Riku Rikkola**. Pahoittelumme.





## Vivid OPD 2023 in the graceful Carelia hall in Joensuu

This year Optics and Photonics days of Finland (OPD 2023) gathered more than 300 participants and 34 exhibitors in the beautiful Carelia Hall, the main festivity hall of the Joensuu campus of the University of Eastern Finland and the home of the symphony of the city of Joensuu. The classical building has been designed by the famed architect team Jan Söderlund & Erkki Valovirta. To my surprise I found out that my school mate was involved in the design as a partner of the team. The Days were sponsored by Edmund Optics and SPECIM (gold), kontram, THORLABS, Microsoft and EKSPILA (silver).

The program followed our traditional convention including four plenary presentations. In the industrial sessions plenaries were given by D.Sc. **Sanna Yliniemi** from Dispelix Oy, Finland on 'Waveguide technology for wearable XR glasses', Dr. **Martin Gerken** from HENSOLDT Optronics, Germany on 'Multispectral imaging in defense applications'. In the academic sessions Assoc. Prof. **Emiliano Descrovi** from

Polytechnico di Torino, Italy gave a presentation on 'Light-responsive nano and macro structured azobenzene doped polymers' and Prof. **Clara J. Saraceno** from Ruhr University Bochum, Germany on 'Ultrafast laser technology for generating THz light and applications'.

The academic program consisted of four sessions: *Integrated Photonics, Sensing and Imaging, Emerging active materials and devices and Quantum technology*, comprising of 16 invited oral presentations. From these presentations Ph.D. student **Moona Kurttila** from the University of Jyväskylä won the best oral presentation price of the year. The industrial program consisted of four sections as well: *Nano & Micro Photonics, Photonics in Security & Defence I & II and Spectral & Hyperspectral imaging*, comprising of 16 presentations. The program committee had clearly taken into account of the present day global geopolitical tensions giving the audience a glimpse of technology developments in this often hidden and highly advancing area.



“

In summary, collaboration seems to work in photonics in Finland as the annual growth rate of the industry is  
**15-20%**



Kuvat: Tuukka Pakarinen

In addition, two poster sessions were on display comprising 72 presentations in all. Out of these, two posters were given the annual poster reward. One of them went to **Jani Patrakka** from the Tampere University on a poster with a title of *'Bio-based optical fibers: Environmental sensing and short-range communication'* and the other to **Atsu L. Asilevi** from the University of Eastern Finland who presented a poster with a title of *'Multiple Bloch surface wave excitation with gratings'*.

The photonics flagship program PREIN funded by the Academy of Finland and including the universities of Tampere, Aalto and Eastern Finland as well as VTT organized a workshop in close collaboration with the OPD 2023 program. The chair of the program prof. Goery Genty gave a nice overview of the structure of the program in Life Sciences and Health care, Environmental monitoring, Quantum technologies and Photovoltaics & Clean Energy research. A positive development has been seen in increasing industry funding of the program over the years. Ass. Prof. **Andre-**

**as Norrman** from the University of Eastern Finland introduced the audience in a nice way the future scenarios of photonics-based quantum technologies. According to Prof. **Jyrki Saarinen** from the same university efforts are still needed to reach the ambitious final goal of the program: 10 break-through results of global impact. He stressed the need for increasing collaboration between the partners. The session ended with a panel discussion on ever-lasting topic of Research and Industry collaboration. The session was chaired by **Matti Mannonen**, Technology Industries Finland and attended by **Minna Hendolin**, University of Eastern Finland, **Veli-Pekka Ihanus**, Business Finland, **Seppo Honkanen**, University of Eastern Finland and **Samuli Siitonen**, Nanocomp. In summary, collaboration seems to work in photonics in Finland as the annual growth rate of the industry is 15-20%. The industry includes some 300 companies employing about 6000 employees and has an annual turnover 2 billion€ with majority of the products being exported from the country.



Atsu L. Asilevi & Moona Kurttila



Kuva: Anne-Maria Kankaisto



Prof. Clara J. Saraceno

of the year 2022 was rewarded to **Yadong Wang** from Aalto University with title *Transient Nonlinear Optics of Two-Dimensional Layered Materials*, followed by announcement of the best photonics company of the year 2022 **SENOP Oy**, which was received by CTO **Jussi Rautiainen**. FOTONI congratulates both award winners and will feature their achievements in more detail in the fourthcoming FOTONI 2\_2023 issue. After the dinner the program continued in the Las Palmas Kimmel night club towards morning hours with compelling cha, cha, cha,....

In Kustavi 05.06.2023  
Jouko Korppi-Tommola

During the days *Nordic Photonics meeting*, local *Photonics Center event*, *Photonics Student Meet-up*, *Job fair* and *ClusterXchange* were organized. In the student event activities of three photonics companies Dispelix, Chipmetrics, Patria as well as those of World Metaverse Council and Photonics Finland were presented. Continuous efforts are needed to attract students to choose photonic as their major, in particular female students. A convention *Women in Photonics* session was also realized. In this session three oral presentations were

given. **Minttu Tuononen** from Vaisala Oy discussed on *Potential future competence needs in optical weather measurements*, **Ulla Haapanen** from Modulight Oy on *Shining light on new laser therapies on oncology* and **Birgit Päiväranta** from Microsoft on *Mixed reality and optical engineering*. The session ended with a panel discussion *Where is photonics research going?*.

The conference dinner took place in the beautiful surroundings of the river Pielisjoki at the classical hotel Kimmel. Along the night the best photonics Thesis

Jussi Rautiainen



Kuva: Tuukka Pakarinen

**FOTONI congratulates both award winners and will feature their achievements in more detail in the fourthcoming**

**FOTONI**

# A Decade Journey of the Photonics Research Group at Aalto University



Prof. Zhipei Sun

## Introduction to the group:

It is an honour to share the story of the photonics research group at Aalto University in Fotoni, as we celebrate its 10th anniversary this year. Established in 2013, the group, led by Prof. Zhipei Sun at the Department of Electronics and Nanoengineering, Aalto University, is located at the Micronova research facility in Otaniemi, the Finnish national infrastructure for micro- and nanotechnology. Over the last ten years, we have spearheaded various pioneering research projects across multiple fields, including photonics, physics, quantum technology, nanotechnology, energy, and sustainability. Notable projects include the European Research Council advanced project, the European Quantum Flagship project, the Academy of Finland Center of Excellence, and the Academy of Finland Photonics Flagship.

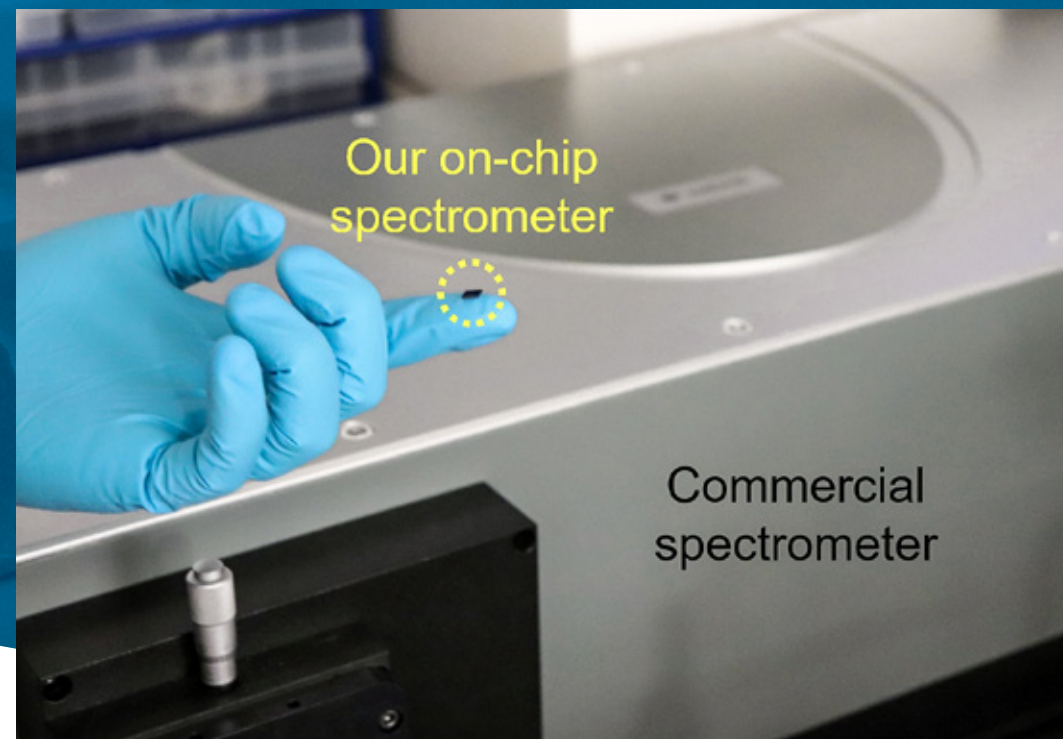
## Background of Prof. Zhipei Sun:

Prof. Zhipei Sun earned his doctorate degree in Optical Physics from the Institute of Physics, Chinese Academy of Sciences, Beijing. He began his postdoctoral career at the ICFO-Institute of Photonics Science

in Barcelona, Spain, and later worked as a senior research associate at Cambridge University, UK, till 2012. Driven by the excellence of Finnish research and education, as well as the state-of-the-art research infrastructure, Prof. Sun joined Aalto University in 2013 to establish the research group with a vision to push the boundaries of knowledge and foster innovation in photonics and optoelectronics.

## Group diversity:

Since its inception, the group has experienced remarkable growth, currently comprising ~20 talented researchers from over 10 nationalities representing three continents. The multicultural and international working environment nurtures an inclusive mindset among group members, fostering social and research career development. The group's alums have attained remarkable achievements, with many occupying prominent positions in renowned research institutions and esteemed companies across the globe. Their accomplishments stand as a testament to the group's commitment to excellence and the valuable opportunities provided to its members.



## Research achievements:

The group's current research interests encompass fundamental and applied sciences in nanophotonics. Over the past decade, they have published numerous scientific breakthroughs in high-impact journals, including publications from the Science and Nature portfolio journals. Prof. Sun consistently ranks among the highly cited researchers in his field. One of the group's remarkable contributions lies in the development of miniaturized optical spectrometers. Through close collaborations with international academic partners, we have successfully created one of the world's smallest spectrometers with a tunable van der Waals junction. This disruptive breakthrough has garnered substantial international media attention and offers the potential to transform the landscape of current imaging and sensing technologies.

“Prof. Sun joined Aalto University in 2013 to establish the research group with a vision to push the boundaries of knowledge and foster innovation in photonics and optoelectronics.”





**Collaboration is the key:**

Since its establishment, the Photonics research group has actively fostered collaborations and knowledge exchange. We engage in enthusiastic collaborations with leading institutions in Finland, such as Jyväskylä University, the University of Eastern Finland, Tampere University, the Finnish Geospatial Research Institute and VTT Technical Research Centre of Finland. The group also collaborates extensively with international institutions across Europe, the UK, the US, and Asia, promoting cross-disciplinary research and nurturing young talents.

**Future perspective of the group**

Looking ahead, the research group remains committed to pushing the boundaries of light science and addressing societal challenges with innovative photonic solutions. With a decade of remarkable accomplishments behind us, we dedicate ourselves to making significant contributions to society and inspiring the next generation of researchers.

In the words of Prof. Sun,  
**“Our journey has just begun. The coming decades hold even brighter opportunities for scientific adventure, and we are excited to embark on this journey together.”**

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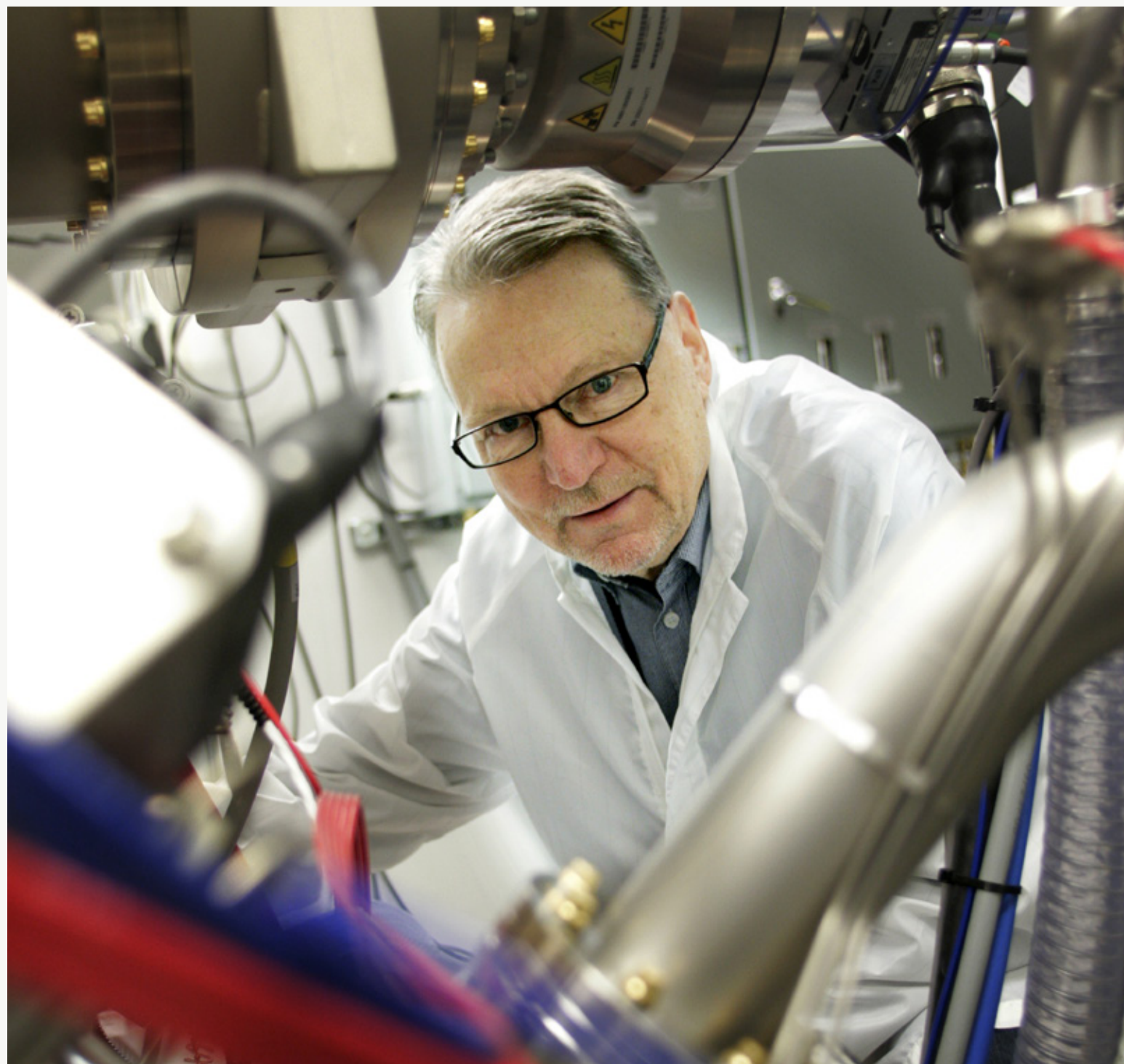
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*Obituary of  
Emeritus Professor*

# **Markus Pessa**

*(“Mr. LASER”)*

Emeritus Prof. Markus Pessa, a pioneer of semiconductor technology in Finland and a long-time Professor of Physics at Tampere University of Technology, passed away on the 31st of December 2022, weakened by treacherous Alzheimer disease. Prof. Pessa had major contributions in the field of material science and semiconductor technology spanning over more than three decades of professional activity. He was the founder and Director of the Optoelectronics Research Centre (ORC), the cradle of semiconductor and fiber laser industry in Tampere, until the end of 2009, when he retired from professional life.

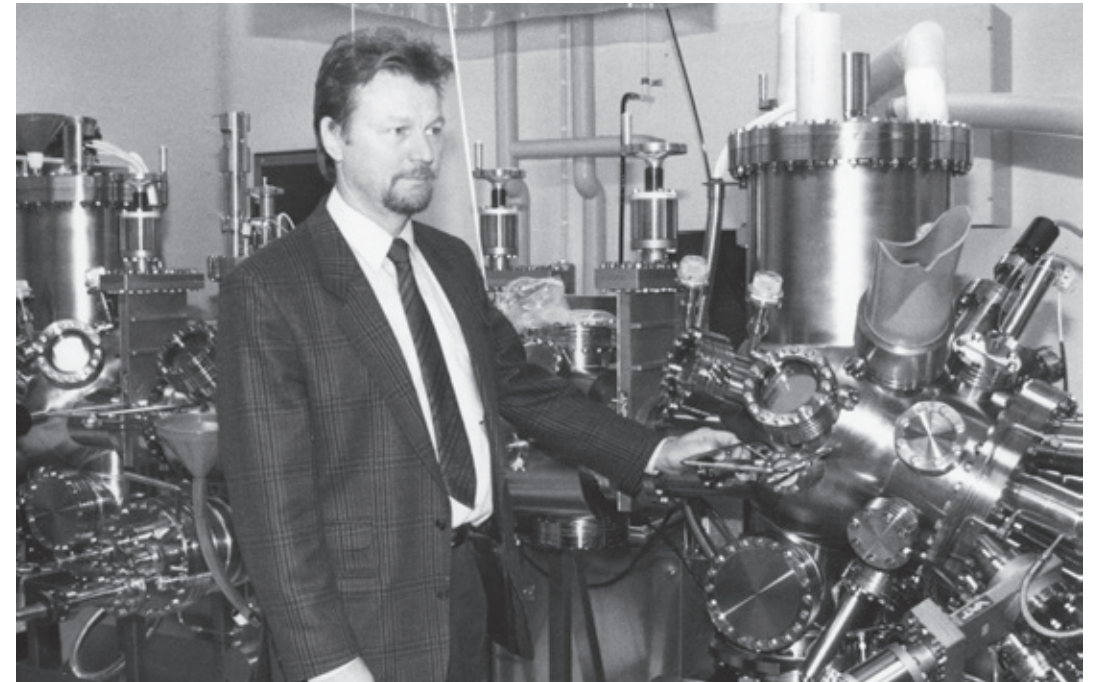


*His legacy should be treasured and preserved beyond the knowledge of people that had the chance know him directly.*

Born in 1941 in Petsamo, near Liinahamari village and after being evacuated to Jokmokk in Sweden (one of the 70000 children taken to safety to Sweden during the war) till the end of the war, he returned with his mother first to Oxå island near Tornio and finally the family was reunited in Lautiosaari village near Kemi back in Finland. After five years at Pölhö primary school, he started college studies and graduated from Kemi lyceum in 1961, obtained his Physics Master of Science degree in 1966, and his Licentiate diploma in 1970 from the University of Oulu under supervision of professor Matti Karras. After finishing his first research period abroad at the University of Southampton he defended his Ph.D. Thesis on photoelectron spectroscopy in 1972 at the University of Turku, where he soon also obtained a Docentship in Physics. During 1970 - 1976 he was able to win several research fellowships, which opened up post-doctoral studies in the United States, England, Germany and Ukraine. In particular, he considered time at Ludwig-Maximilian University in Munchen, funded by Alexander Humboldt Foundation and Academy of Finland, as one of the most productive periods of his scientific career. In 1976 he

was nominated a professor of Physics at Tampere University of technology, becoming a legendary figure for Tampere education and research ecosystem.

Professor Emeritus Markus Pessa was a world renown scientist in the field of molecular beam epitaxy (MBE) and optoelectronics, receiving numerous national and international distinctions. In 1996 he received the *Knight, First Class*, of the Order of the White Rose of Finland, awarded by the President of the Republic of Finland. In 2006 he was elected a *Foreign Associate* of the United States National Academy of Engineering, as the first Finnish citizen to receive such honorary position. Other important distinctions include, *Professor of the Year* (1997), elected by the Trade Union of University Professors, Fellow of the Institute of Physics, London, recipient of an Innovation Prize awarded by the New Technology Foundation (Finland) in 2005, for his contributions to the development of laser technology. In 2006 he received a *Gold Medal of the City of Tampere* and a year later a *Golden Public Service Medal* from the President of Finland. He was amongst the first recipients of the *Millennium Distinction Award* in 2007. Xian Institute of Optics and Precision Mechanics of *Chinese Acad-*



*emy of Sciences* nominated him as honorary professor in 2009. He was a member of the Finnish Academy of Sciences and Letters since 1994. The *Finnish Academy of Sciences and Letters Academy Award* for 2016 was presented to him for lifetime career achievements in optoelectronics and semiconductor research. In 2020 *Photonics Finland* invited him to become the first honorary member of the Society.

One of the most visible roles that made Prof. Pessa known to the public at large is his contribution to setting up *semiconductor and laser manufacturing industry in Finland*. He was among the first in Europe to use gas phase *molecular-beam-epitaxy* (MBE) crystal growth method and later on became the developer of solid-state MBE. Both methods allow making molecular semiconductor layers at atomic precision and production of structures fundamental in many optoelectronics applications, like

light emitting diodes (LED), semiconductor lasers, optical detectors and high efficiency multijunction solar cells. Among 455 published papers in refereed journals, he contributed to many technology landmarks in the area of molecular beam epitaxy and optoelectronics. In particular, related to the early years of applying MBE technology for laser diodes manufacturing, his work has been at the frontier of developing aluminum-free 980-nm pump laser diodes and high-power red laser diodes technologies with profound impact on many applications. Professor Pessa supervised and mentored more than 30 Ph.D. students many of whom have become professors and key players in photonics industry in Finland.

He was also a great mentor for students and young researchers inspiring them with his energy, curiosity, and thirst for knowledge. His legacy should be treasured and



preserved beyond the knowledge of people that had the chance know him directly. To this end, *The Markus Pessa International Summer School* has been established as a continuation of the well received Tampere Summer Schools and will be organized for the first time on 7-11th of August 2023 at Tampere University (<https://events.tuni.fi/pessasummerschool/>)

During his leadership of ORC group, he contributed to establishing five spin-offs in Tampere, all linked to laser and semiconductor technology, gaining him the media title of "Mr. Laser". His work and spiritual legacy has been continued by the people he mentored, trained, and inspired. After his retirement, three other spinoffs have been established by former ORC researchers and his disciples (Picophotonics, Vexlum, and Ampliconyx). When combined with earlier spinoffs, the laser industrial ecosystem around Tampere University amounts for more than 250 highly skilled professionals and unique fabrication capabilities, probably the highest density of laser technology companies in Europe. Thinking over the years, in the current days of semiconductor Chips Act initiative and world competition for deep tech, Markus seminal work on establishing sem-

iconductor technology and photonic chips industry in Finland seems fundamentally impactful and actual than ever.

Markus had two children, Kristiina and Alexander. They remember him as an encouraging father. He emphasized the importance of continuing studies in human life. He was deeply interested in international affairs and he worried about Finland keeping up with global competition. Markus was a patriotic person, but at the same time he could comprehend cultures of other countries, the understanding arising from his extensive international research activities. He was a genuine supporter of co-operation in particular in science. In his youth he played bandy and soccer and went also ski jumping. Later on, during his free time he played snooker, took off to biking trips and was interested in art works, history and astronomy. His mental heritage will remain in our minds.

**Mircea Guina**  
**Risto Nieminen**  
**Alexander Pessa**  
**Kristiina Pessa**  
**Jouko Korppi-Tommola**

References:

- 1) Text was based in part on the obituary written by Mircea Guina and Risto Nieminen to be published in the annual year book of Finnish Academy of Sciences and Letters of 2023.
- 2) <https://sites.google.com/site/keminlyseonlukionseniorit/etusivu/elämäntarinoita/tiedemaailma/pessa-markus-v>
- 3) <https://www.photonics.fi/2020/06/18/markus-pessa-photonics-finland-kunniajaseneksi/>
- 4) [https://acadsci.fi/wp-content/uploads/2016/05/palkinto\\_pessa.pdf](https://acadsci.fi/wp-content/uploads/2016/05/palkinto_pessa.pdf)
- 5) <https://www.is.fi/tyoelama/art-2000001457355.html>
- 6) [https://english.cas.cn/newsroom/archive/coop\\_archive/inc2009/200909/t20090923\\_42587.shtml](https://english.cas.cn/newsroom/archive/coop_archive/inc2009/200909/t20090923_42587.shtml)

Professional landmarks

- 1976** Markus got his professorship at Tampere University of Technology
- 1984** 1<sup>st</sup> self-made MBE was built (CdTe and CMT)
- 1985** 1<sup>st</sup> GaAs MBE was built
- 1985-1988** CdTe & CdHgTe (CMT) research by MBE
- 1987-1991** marked the construction of cleanroom for optoelectronics device processing, initiating three photonics research areas: lasers, detectors, solar cells
- 1988** A dual chamber MBE system for InP was installed (8-port MBE & GSMBE)
- 1989** Solar cell research activities started (InP and GaAs solar cells)
- 1991** The first spin-off, TUTCORE, was established
- 1990-1994** First EU project for developing Al-free 980 nm pump lasers by GSMBE
- 1993** ZnSe activities for green LEDs started, 3<sup>rd</sup> MBE reactor (ZnSe MBE)
- 1995** The first MBE grown phosphorus containing laser diode (at 980 nm) in the world (using solid source cracker cell) was made
- 1995** Development of Dual-junction (tandem) solar cells started in ESA programs
- 1995** 4<sup>th</sup> MBE reactor (SSMBE; "10-1")
- 1995-1996** New MBE reactor for growth of ZnSe and related materials
- 1996-1998** Developing high performance laser diodes emitting at 630-685 nm
- 1998** 5<sup>th</sup> MBE reactor (SSMBE; "10-2")
- 1998** The highest ever reported quantum efficiency (92%) of 680 nm single-mode laser diodes
- 1998** ZnSe-based RT CW green laser diodes (lifetime < 30 s) among the first in Europe
- 1999** Optoelectronics Research Centre, ORC was established (former Semiconductor Laboratory of Physics Department of Tampere University of Technology)
- 1998-2000** Developing MBE technology for resonant cavity light emitting diodes (RCLEDs) and vertical cavity surface emitting lasers (VCSELs) in the red
- 1999** ORC's Optical Communications Laboratory was established
- 2000** The second spin-off, Modulight, was established
- 2001** Demonstrating a high-temperature, high-power GaAs-based nitride laser operating at 1300 nm among the first of its kind in Europe
- 2003** The third spin-off, Corelase, was established
- 2003** The fourth spin-off, EpiCrystals, was established
- 2004** The fifth spin-off, RefleKron, was established
- 2005** Founder of the Laser Competence Centre Finland to build a bridge between academia and industry
- 2009** Markus retired from professional activities



*Obituary of  
Emeritus Professor*

# Jari Turunen



On May 9, 2023, Professor Jari Turunen sadly passed away. Although his condition rapidly deteriorated, he never lost his positive attitude and continued to work till the end.

Jari was a remarkable scientist and his passion for physics was unrivaled. He would produce numerous pages of text, equations, and illustrations within a matter of just a few days when excited about an idea. Getting up at dawn, he would fill inboxes with emails about his latest theories and concepts, often before others had even sipped their morning coffee. Jari's drive was unparalleled, and every conversation with him had the potential to initiate a new topic for a doctoral thesis. As an Academy Professor – the most prestigious position for research excellence in Finland – Jari received multiple accolades for his pioneering work.

There are only few people as productive as him. Jari made several seminal contributions to various areas, and chances are high that anyone working within the optics community will eventually stumble upon one of his papers. Jari may be best known for his pioneering work in diffractive optics and coherence theory, but he has written an impressive number of contributions (more than 500) in the wider field of optics, including publications in peer-reviewed journals, book chapters, and conference proceedings. Jari was always passionate about research and, regardless of the scientific discussion, he would swiftly transcribe his ideas onto paper and start working on their theoretical foundations. As a striking example of his enthusiasm for research, Jari still holds the record for shortest time from an original concept to journal submission at the Uni-



Those of us who have been fortunate enough to have worked with him and known him for many years, are forever indebted to Jari's scientific contribution and kindness.

iversity of Eastern Finland – an astonishing three days – achieved together with Dr. Jani Tervo 23 years ago. This groundbreaking article has since accumulated over 200 citations.

Jari was a unique individual in more than one way. Inspired by his childhood in Savonlinna, as well as his time as a post-doctoral researcher in Edinburgh, Scotland, he embarked on an extraordinary endeavor – he constructed a castle as his home. Almost every facet of the castle was designed and built by Jari's own hands, and the castle even included a dungeon, various medieval execution devices, and weaponry. As a joke, Jari would playfully

threaten his Ph.D. students with confinement within the castle's dungeon if they failed to meet their Thesis deadlines. This was undoubtedly motivating, and there is no record of anyone being subjected to such punishment. Jari also knew how to reward his students, knighting them as members of the Rectangular Table of the Puntarikoski Castle following their successful defenses; their sworn duty being the pursuit of scientific advancement. Colleagues and collaborators were also welcomed within the castle walls, where dinner and sauna sessions served as fertile grounds for scientific discussions and fostering of new projects.







June 1, 2000 / Vol. 25, No. 11 / OPTICS LETTERS 785

## Paraxial-domain diffractive elements with 100% efficiency based on polarization gratings

Jani Tervo and Jari Turunen

*Department of Physics, University of Joensuu, P.O. Box 111, FIN-80101 Joensuu, Finland*

Received February 2, 2000

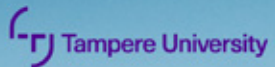
The concept of polarization freedom is employed to design diffraction gratings that are capable of transforming an electromagnetic plane wave into two or three diffraction orders with an arbitrary efficiency distribution among them, such that the combined efficiency of the signal orders is always equal to 100%. As a special case we consider paraxial-domain duplicators and triplicators with 100% efficiency, which is not possible for illumination by scalar waves. Diffractive elements that are capable of performing the required wave transformation must modulate the state of polarization of the incident field. © 2000 Optical Society of America  
OCIS codes: 050.1970, 050.2770.

Beyond his scientific accomplishments, Jari held a passion for photography and gardening. His lens captured migrating birds and deer wandering through his yard, beautiful sunsets on the horizon, or the charm of his castle shrouded in mist. His cats and gardens also frequently found their place in Jari's photographs. Those of us who have been fortunate enough to

have worked with him and known him for many years, are forever indebted to Jari's scientific contribution and kindness. He leaves behind a remarkable legacy, a castle without its lord, and his beloved wife, Sirpa. Jari will be dearly missed.

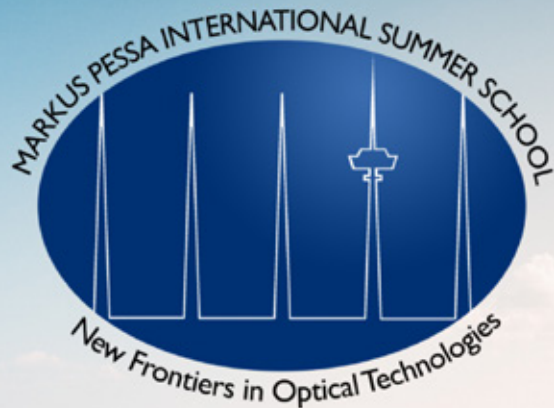
**Matias Koivurova and Goëry Genty**  
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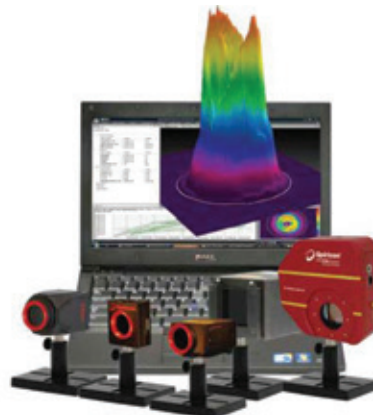
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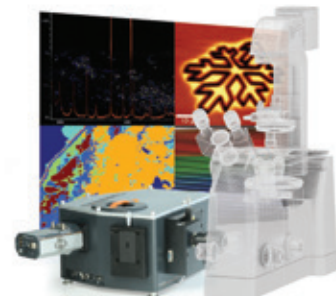
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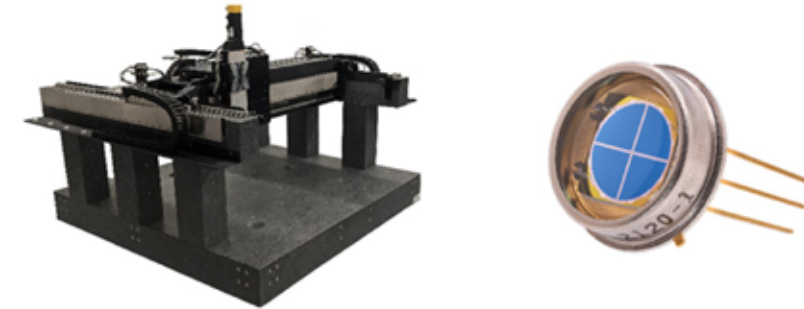
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