

H O L O

Newsletter No 2

December 2017

Dear Readers,

We are happy to announce the release of our second HOLO project newsletter intended to keep you updated with all the latest news and results of the ongoing research collaboration between the consortium partners; the Institute of Applied Physics of the Academy of Sciences of Moldova, University of Stuttgart, Tampere University of Technology and Intelligentsia Consultants.

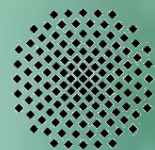


HOLO was funded by the European Commission's Horizon 2020 programme with an overall aim to boost the scientific excellence and innovation capacity in digital holographic microscopy of the Institute of Applied Physics of the Academy of Sciences of Moldova by implementing a science and innovation strategy focused on two sub-topics:



**TAMPERE
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TECHNOLOGY**

- ❖ Design and optimization of diffractive optical elements (DOE) to improve digital holographic microscopy (DHM)
- ❖ Development of advanced image processing algorithms for digital holographic microscopy (DHM) using diffractive optical elements (DOE)



**Universität
Stuttgart**

During the last few months the HOLO partners have been intensively collaborating and sharing their knowledge through many successful events such as several staff exchanges as well as the acclaimed second summer school held in Germany.

The HOLO project is soon reaching its second anniversary and we are very proud to have the opportunity to share this scientific innovation journey with you. In this newsletter, you will find detailed information on how the partners continue to achieve their shared goals.



We hope that you enjoy your reading and continue to stay updated with the upcoming newsletters by visiting our website H2020-HOLO.



The HOLO project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 687328



Staff exchanges

IAP-ASM → USTUTT

In February 2017, two experts from the Institute of Applied Physics of the Academy of Sciences of Moldova, Dr. Elena Achimova and Dr. Vladimir Abaskin visited the Institute of Technical Optics, University of Stuttgart. During the visit, the Moldavian researchers together with their German colleagues, Dr. Giancarlo Pedrini and Dr. Daniel Claus, designed an installation for recording phase structure by application SLM and powerful laser VERDI. Moreover, new diffractive phase structures were recorded on the samples of Chalcogenide Glasses Nanomultilayers and Azo-died polymers prepared in Moldova. The recorded diffractive phase structures were then investigated by using a digital holographic microscope available at the Institute of Technical Optics. The results of the measurements with the holographic microscope have shown that the diffractive phase structures written on the chalcogenide material and azopolymers have complicated surface structure.



In June 2017, Veronica Cazac, Constantin Loshmanskii and Alexei Meshalkin visited the University of Stuttgart and together with their German colleagues measured samples with harmonic ratings placed at different angles in sample plane in order to measure biological samples with vortex plates already recorded in Chisinau. They continued their ongoing research on stitching of DHM's images and worked with the partner university's white light digital holographic system.

IAP-ASM → TUT

In March 2017, scientific researcher Alexei Mesalchin and master student Veronica Cazac from the Institute of Applied Physics of the Academy of Sciences of Moldova visited Tampere University of Technology in Finland. During the visit, together with the Finnish group leader Prof. Vladimir Katkovnik and Dr. Igor Shevkunov, they simulated phase step hologram recording in dependence of image propagation using Matlab software. Moreover, application of propagation of phase step for real image was done. It was shown that application of propagation algorithm gives more adequate image of phase object. In addition, the holographic experiment was modelled: application of vortex phase mask for the reconstruction of two phase objects was carried out. Holographic experiment where vortex phase mask is applied for the reconstruction of two the phase objects was compared with the experiment without vortex.



In April 2017, Dr. Giancarlo Pedrini from the Institute of Technical Optics and Igor Shevkunov from Tampere University of Technology visited Chisinau and helped to set up various optical schemes for holographic microscopic investigations.



Second summer school in Stuttgart, Germany

The summer school on “Digital Holography and related Techniques” was held in Stuttgart, Germany between 21st - 23rd of June 2017. The event hosted over 40 participants, not only from the consortium partners, but also from universities in the Philippines, the USA, the UK, Ireland, India, China etc. During these very successful three days, a diverse range of topics were presented. Some of the most notable talks were:

- ❖ The application of digital holography for non-destructive testing particularly the use of Electronic Speckle Pattern Interferometry (ESPI) to detect invisible on the surface intrinsic defects of wood samples.
- ❖ Algorithms and methods for sparse modeling of wavefronts and their applications for phase imaging.
- ❖ The achievability of high-accuracy restrictions on phase modeling with sub-pixel resolution going up to 32 times smaller with respect to the sensor pixel size.
- ❖ DHM’s usage in the investigation of the influence of drugs, toxins and nanoparticles on cell morphology, growth and motility and the analysis of the cellular response to optical manipulation and the observation of cancer cell migration in 3D tissue models.
- ❖ Label-free Imaging of Thick Tissues using Gradient Light Interference Microscopy (GLIM).
- ❖ Optimal tomography of single living cell, cell clusters and cell spheroids and various applications ranging from the detection of cell death to the uptake and efficacy of cytostatic drugs as well as photodynamic tumor therapy.





In other news

Margarita Reyes from Intelligentsia Consultants visited Chisinau, Moldova from August 23-25. Veronica Cazac and Alexei Meshalkin were present to give a detailed tour of the ASP-IAP and their laboratories. They shared progress of their work within HOLO and their collaboration will be used in an upcoming promotional video about their role in the project.



Upcoming events and activities

The HOLO team is pleased to announce that the third summer school will take place in Tampere, Finland in June 2018 and the next conference hosted by the Institute of Applied Physics of the Academy of Sciences of Moldova will be held in September 2018.



To learn more about the HOLO project activities and achievements, please visit our website

www.h2020-holo.com

Register now to our mailing list and receive the HOLO newsletters as soon as they are released.

If you have further questions regarding the project, feel free to contact the coordinator Dr. Achimova.



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