Workshop Program

Eurographics
EUROPEAN ASSOCIATION FOR COMPUTER GRAPHICS

About

The annual Eurographics Workshop on Visual Computing for Biology and Medicine (EG VCBM) addresses the state of the art in visual computing research with a strong focus on applications in biology and medicine. It provides an interdisciplinary forum for experts (researchers and practitioners) from visualization, visual analytics, computer graphics, image processing, computer vision, human computer interfaces as well as experts from biology and medicine, jointly working on next generation visual computing solutions for medicine, healthcare and the biotechnology sector. This year's workshop (already the 11th VCBM since its foundation in 2008) will be held during September 22–24, 2021, in Paris, France, under the patronage of the French Molecular Graphics and Modeling society GGMM. All papers (regular papers as well as short papers) focus on a well-defined biological/medical problem, and demonstrate a significant innovation or improvement in visual computing.

Website `https://conferences.eg.org/vcbm2021/`

Organizing committee

- General chairs:
  Marc Baaden (CNRS, France)
  Tobias Isenberg (Inria, France)

- Program chairs (full papers):
  Steffen Oeltze-Jafra (Hannover Medical School/University of Magdeburg, Germany)
  Noeska N. Smit (University of Bergen, Norway)
  Björn Sommer (Royal College of Art, United Kingdom)

- Program chairs (short papers):
  Kay Nieselt (University of Tübingen, Germany)
  Thomas Schultz (University of Bonn, Germany)

- Program chairs (posters):
  Jessica Jonquet (University of Reims Champagne-Ardenne, France)
  Fritz Lekschas (Harvard University, USA)

- Program chairs (image contest):
  Jean M. Favre (CSCS Manno, Switzerland)
  Peter Mindek (TU Wien, Austria)

- Outreach, publicity, and web chairs:
  Barbora Kozlíková (Masaryk University, Czech Republic)
  Katarína Furmanová (Masaryk University, Czech Republic)

- Remote attendance chairs:
  Eric Mörth (University of Bergen, Norway)
  Sherin Sugathan (University of Bergen, Norway)

Timetable

Wednesday, September 22

14:00–14:30	**Registration**	
14:30–15:00	**Opening and welcome remarks**	
15:00–16:00	**Keynote**	
	David Glowacki	Cloud-mounted virtual reality experiments during COVID times
16:00–16:30	**Tea and coffee break**	
16:30–18:00	**Session 1: Getting an overview in bio (and medicine)** *session chair: Barbora Kozlíková*	
	Laura Garrison, Monique Meuschke, Jennifer Fairman, Noeska Smit, Bernhard Preim, Stefan Bruckner	An Exploration of Practice and Preferences for the Visual Communication of Biomedical Processes *(full paper)*
	Yong Wan, Holly A. Holman, Charles Hansen	Interactive analysis for large volume data from fluorescence microscopy at cellular precision *(invited journal presentation)*
	Karina Ruzaeva, Katharina Nöh, Benjamin Berkels	Polar space based shape averaging for star-shaped biological objects *(short paper)*
	Daniel Pahr, Hsiang-Yun Wu, Renata Georgia Raidou	Vologram: An Educational Holographic Sculpture for Volumetric Medical Data Physicalization *(short paper)*
18:00–19:30	**Welcome reception**	

Thursday, September 23

09:00–09:30	**Registration**	
09:30–11:00	**Session 2: Shooting rays of sorts through people** *session chair: Thomas Schultz*	
	Thais Caldeira, Paulo Rogério Julio, Simone Appenzeller, Leticia Rittner	inCCsight: A software for exploration and visualization of DT-MRI data of the Corpus Callosum *(invited journal presentation)*
	Katarína Furmanová, Ludvig P. Muren, Oscar Casares-Magaz, Vitali Moiseenko, John P. Einck, Sara Pilskog, Renata Georgia Raidou	PREVIS: Predictive visual analytics of anatomical variability for radiotherapy decision support *(invited journal presentation)*
	Samin Sabokrohiyeh, Kathleen Ang, Faramarz Samavati	Strategies for Generating Multi-Time Frame Localization of Cardiac MRI *(short paper)*

	Caroline Magg, Laura Toussaint, Ludvig P. Muren, Danny Indelicato, Renata Georgia Raidou	Visual Assessment of Growth Prediction in Brain Structures after Pediatric Radiotherapy *(short paper)*
11:00–11:30	**Tea and coffee break**	
11:30–13:00	**Session 3: Let's look into your brains** *session chair: Bernhard Preim*	
	Vetle Hushagen, Gustav Tresselt, Noeska Smit, Karsten Specht	The Role of Depth Perception in XR from a Neuroscience Perspective: A Primer and Survey *(full paper)*
	Johannes Gruen, Gemma van der Voort, Thomas Schultz	Reducing Model Uncertainty in Crossing Fiber Tractography *(full paper)*
	Sherin Sugathan, Hauke Bartsch, Frank Riemer, Renate Gruner, Kai Lawonn, Noeska Smit	Interactive Multimodal Imaging Visualization for Multiple Sclerosis Lesion Analysis *(full paper)*
13:00–14:30	**Lunch**	
14:30–16:00	**Session 4: The path that blood takes** *session chair: Ingrid Hotz*	
	Pepe Eulzer, Kevin Richter, Monique Meuschke, Anna Hundertmark, Kai Lawonn	Automatic Cutting and Flattening of Carotid Artery Geometries *(full paper)*
	Benjamin Behrendt, David Pleuss-Engelhardt, Matthias Gutberlet, Bernhard Preim	2.5D Geometric Mapping of Aortic Blood Flow Data for Cohort Visualization *(full paper)*
	Vikram Apilla, Benjamin Behrendt, Kai Lawonn, Bernhard Preim, Monique Meuschke	Automatic Animations to Analyze Blood Flow Data *(short paper)*
	Kai Ostendorf, Domenico Mastrodicasa, Kathrin Bäumler, Marina Codari, Valery Turner, Martin Willemink, Dominik Fleischmann, Bernhard Preim, Gabriel Mistelbauer	Shading Style Assessment for Vessel Wall and Lumen Visualization *(short paper)*
16:00–16:30	**Tea and coffee break**	
16:30–17:00	**Image contest**	
17:00–17:30	**Poster lightening talks**	
17:30–18:30	**Hybrid poster session**	
19:00–22:00	**Conference dinner (on-site only)**	

Friday, September 24

09:00–09:30	**Registration**	
09:30–11:00	**Session 5: From the spatial to the abstract** *session chair: Renata Georgia Raidou*	
	Florian Heinrich, Vikram Apilla, Kai Lawonn, Christian Hansen, Bernhard Preim, Monique Meuschke	Estimating depth information of vascular models: A comparative user study between a virtual reality and a desktop application *(invited journal presentation)*
	Sanne van der Linden, Jarke J. van Wijk, Mathias Funk	Multiple Scale Visualization of Electronic Health Records to Support Finding Medical Narratives *(full paper)*
	Humberto Garcia Caballero, Alberto Corvo, Fokke van Meulen, Pedro Fonseca, Sebasitaan Overeem, Jarke J. van Wijk, Michel Westenberg	PerSleep: A Visual Analytics Approach for Performance Assessment of Sleep Staging Models *(full paper)*
11:00–11:30	**Tea and coffee break**	
11:30–13:00	**Panel** *session chairs: Christina Gillmann and Noeska Smit*	
	Bernhard Preim, Thomas Wischgoll, Jan Byška, Michael Krone	Open Challenges in Biological and Medical Visualization
13:00–14:30	**Lunch**	
14:30–16:00	**Session 6: Conspiring to cut people open** *session chair: Noeska Smit*	
	Joost Wooning, Mohamed Benmahdjoub, Theo van Walsum, Ricardo Marroquim	AR-Assisted Craniotomy Planning for Tumour Resection *(full paper)*
	Jana Martschinke, Vanessa Klein, Philipp Kurth, Klaus Engel, Ingo Ludolph, Theresa Hauck, Raymund Horch, Marc Stamminger	Projection Mapping for In-Situ Surgery Planning by the Example of DIEP Flap Breast Reconstruction *(full paper)*
	Vuthea Chheang, Patrick Saalfeld, Fabian Joeres, Christian Boedecker, Tobias Huber, Florentine Huettl, Hauke Lang, Bernhard Preim, Christian Hansen	A collaborative virtual reality environment for liver surgery planning *(invited journal presentation)*
16:00–16:30	**Tea and coffee break**	
16:30–17:30	**Capstone**	
	Johanna Beyer	Visual Computing for Exploring Nanoscale Brain Tissue in Connectomics
17:30–18:00	**Awards and closing**	

Feature talks

Keynote speaker: ***David Glowacki***

Title: Cloud-mounted virtual reality experiments during COVID times

Abstract: In 1977, artificial and augmented reality (AR) pioneer Myron Krueger began his paper "Responsive Environments" with the observation that "human-machine interaction is usually limited to a seated (person) poking at a machine with (their) fingers or perhaps waving (their) hands over a data tablet." Krueger went on to speculate that real-time, multisensory interaction between humans and machines might enable exciting and efficient new approaches for exploring realities that are otherwise impossible to access. In this talk, I will provide an overview of how cloud computing and virtual reality are enabling new approaches to scientific research, and how such approaches have helped researchers to make progress during despite COVID-related social distancing restrictions. For example, I will illustrate how new tools at the frontiers of human computer interaction (HCI) and high performance computing (HPC) enable groups of researchers distributed across the world to simultaneously cohabit real-time simulation environments and interactively build, inspect, visualize, and manipulate the dynamics of complex biomolecular structures with atomic-level precision [1,2,3], in order to investigate drug-molecules proposed to target COVID-19 [4]. I will also show how such tools are being used to develop experiences which offer therapeutic and mental health benefits that are statistically indistinguishable from moderate to high doses of psilocybin, a serotonergic psychedelic drug that is being used to treat anxiety, depression, and addiction in clinical contexts [5].

1. M. O'Connor et al., An open-source multi-person virtual reality framework for interactive molecular dynamics: from quantum chemistry to drug binding, J Chem Phys 150(22), 224703, 2019. DOI: 10.1063/1.5092590
2. M. O'Connor et al., Sampling molecular conformations and dynamics in a multiuser virtual reality framework, Science Advances 4(6), eaat2731, 2018. DOI: 10.1126/sciadv.aat2731
3. https://vimeo.com/420036282
4. H. M. Deeks, R. K. Walters, J. Barnoud, D. R. Glowacki, A. J. Mulholland, Interactive molecular dynamics in virtual reality (iMD-VR) is an effective tool for flexible substrate and inhibitor docking to the SARS-CoV-2, J Chem Info Mod 60(12), 5803-5814, 2020. DOI: 10.1021/acs.jcim.0c01030
5. D. R. Glowacki et al., Dissolving yourself in connection to others: shared experiences of ego attenuation and connectedness during group VR experiences can be comparable to psychedelics. arXiv: 2105.07796

Capstone speaker: ***Johanna Beyer***

Title: Visual Computing for Exploring Nanoscale Brain Tissue in Connectomics

Abstract: Recent high-resolution electron microscopy imaging allows scientists to reconstruct neuronal cells and individual synapses in an unprecedented level of detail. Capturing those minute structures is crucial for connectomics, where neuroscientists aim to reconstruct the full wiring diagram of the brain to glean insights into brain physiology and function. However, mammalian brains are staggeringly complex, with tens of millions of interconnected neurons and billions of synapses, making an interactive analysis of the data challenging. This talk will focus on visual computing approaches for capturing, processing, exploring, and analyzing these large and complex datasets and look at future challenges for the visual analysis of the connectome.

List of Posters

On Data-related and Methodological Challenges in Analysis of Structures From Population-based MRIs: An Obstructive Sleep Apnea Application

Tatyana Ivanovska, Amro Daboul, Oleksandr Kalentev *(remote presentation)*

NetLas: Toward an integrated atlas for exploration and analysis of network medicine data

Alessia Palleschi, Marco Angelini *(remote presentation)*

Skin lesion diagnosis for an early inspection of melanoma skin cancer

Jinen Daghrir, Lotfi Tlig, Moez Bouchouicha, Mounir Sayadi *(on-site presentation)*

Virtual Reality for Studying Cardiovascular Anatomy by Assembling Elements

José Juan Reyes-Cabrera, José Miguel Santana-Núñez, Agustín Trujillo-Pino, Manuel Maynar, Miguel Ángel Rodríguez-Florido *(on-site presentation)*

Useful Information

VCBM 2021 takes place at the Institute of Physico-Chemical Biology (IBPC) in Paris.

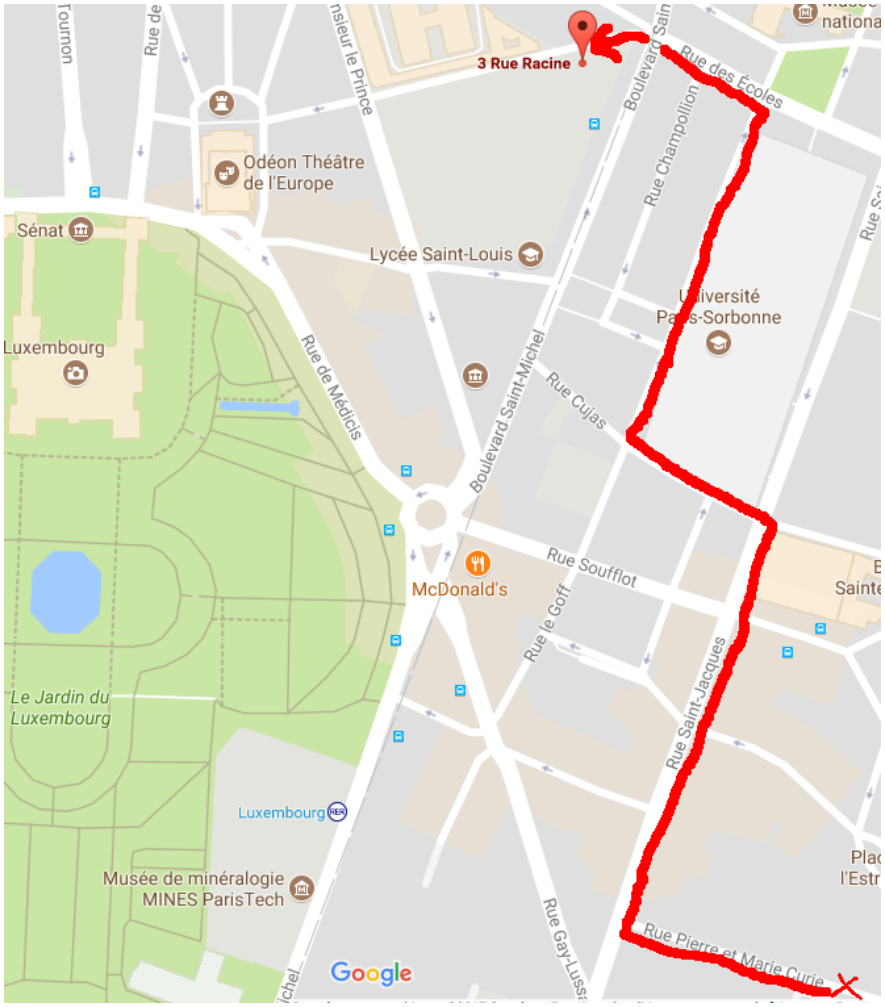
The Institute of Physico-Chemical Biology at CNRS was created in 1930 by the Edmond de Rothschild Foundation. Its mission: Promoting research in all areas of biology. The various departments and laboratories link the CNRS to the Universities Pierre et Marie Curie and Paris-Diderot. The IBPC is supported by the Edmond de Rothschild Foundation for the Development of Scientific Research. It is a member of the Foundation Pierre Gilles de Gennes and an active partner in Paris Sciences et Lettres (PSL) and in all research institutions of the Montagne Ste Geneviève.

Address:
Institut de Biologie Physico-Chimique
CNRS – FRC 550
13, rue Pierre et Marie Curie – 75005 Paris – France

A guest **Wi-Fi** is available during the conference. The IBPC also provides access to **eduroam**, which we recommend as the preferred way to connect.

The **conference dinner** for on-site attendees takes place on Thursday evening at the „Bouillon Racine" at *3 rue Racine*, starting from 19:30 (7:30pm). It is within walking distance and we will organize a group of people to walk from IBPC to the restaurant.

1906
BOUILLON RACINE



COVID-19 measures

Barrier measures have to be maintained including wearing masks, use of hydroalcoholic gel, and gauges in the cafeteria and meeting rooms. The limitations in our meeting rooms are a maximum of 22 people in the conference room and 16 people in the library. Most likely everything will take place in the conference room on the 3rd floor. All breaks must and will be held outside on the porch, terrace, or in the garden.

How to get to the IBPC?

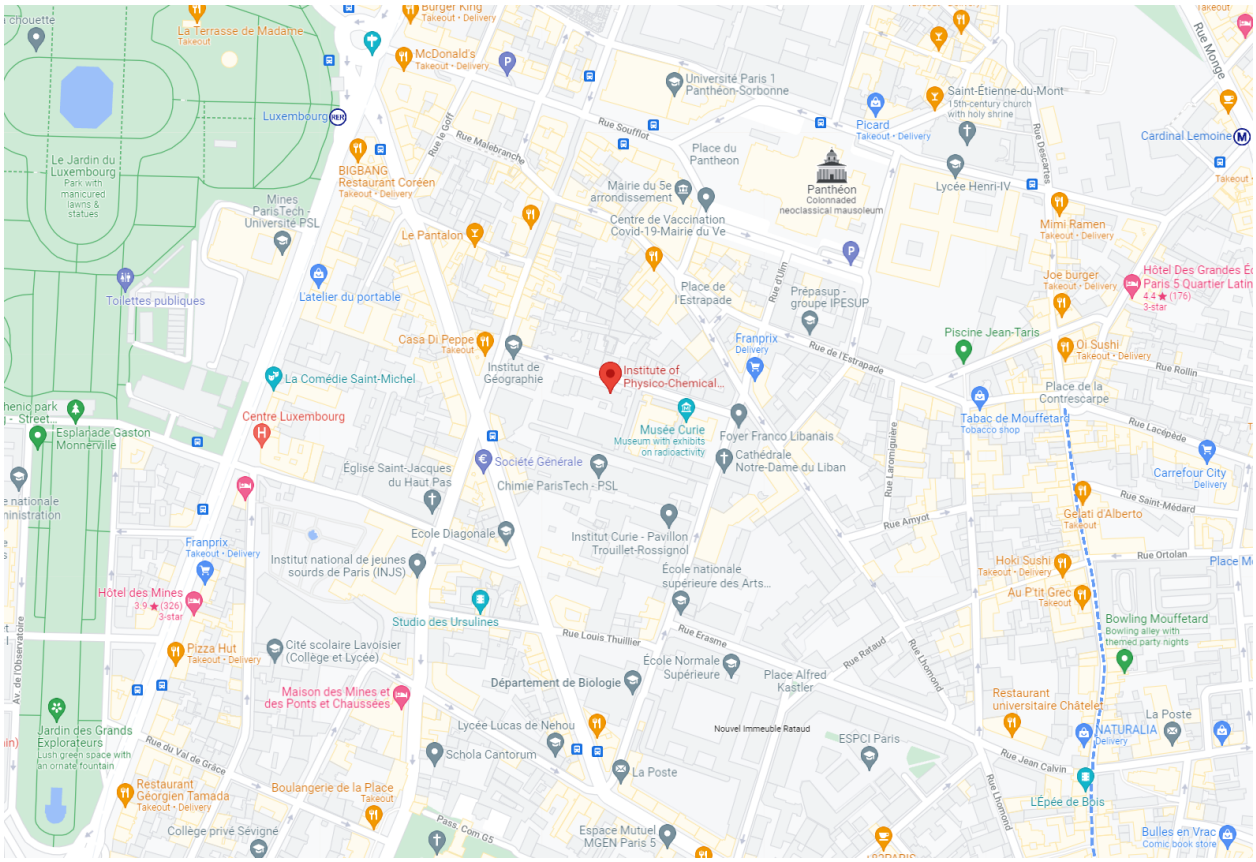
Nearest subway stops:

- Line 7: Place Monge
- Line 10: Cardinal Lemoine
- RER B: Luxembourg

Nearest bus stops:

- Lines 21 and 27: Feuillantines or Berthollet Vauquelin
- Line 38, 82, and 85: Gare du Luxembourg
- Line 47: Monge
- Lines 63, 86, and 87: Monge Mutualité or Maubert Mutualité
- Line 84: Place du Panthéon
- Line 89: Lycee Henri IV
- Line 91: Port Royal-Bertholet

Map:



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Aspiring to be the patient-centric biopharma leader

Career Opportunities in CADD and Structural Biology at UCB Pharma

We are seeking talented scientists to join our Computer-Aided Drug Design (CADD) and Structural Biology teams at UCB.

The roles

At UCB, we have a strong track record in structural biology and structure-based drug design. We have invested in key technologies and capabilities, such as cryo-EM, molecular simulations and advanced structure visualization (e.g., VR, AR and Looking Glass). You will be working in a vibrant environment where wet lab experiments and computational analysis are highly integrated and well supported by state-of-the-art technologies. You will be collaborating with colleagues across multiple disciplines to co-create innovative medicines for our patients.

We are seeking additional team members in the following roles:

- Structural biologist (UK)
- Membrane protein biochemist (UK)
- CADD member with track record of NCE project delivery (Belgium or UK)
- CADD member experienced in Targeted Protein Degradation (Belgium, UK or USA)

Contact us

Please get in touch with us if you are interested! For structural biology opportunities, please email Dave McMillan at David.McMillan@ucb.com. For CADD opportunities, please email Yogesh Sabnis at Yogesh.Sabnis@ucb.com. You can also check other opportunities at careers.ucb.com.

Our company

UCB is a fast-moving global biopharmaceutical company focused on the discovery and development of innovative medicines and solutions to transform the lives of people living with severe diseases affecting the immune and central nervous systems. With more than 8,300 people in approximately 40 countries, the company generated revenue of € 5.3 billion in 2020.

UCB invests more than 25% of revenue in cutting-edge scientific research with the aspiration of solving unmet patient needs. We have a passionate, long-term commitment to the discovery and development of innovative medicines that transform the lives of people with severe diseases.

At UCB everything we do starts with a simple question: “How will this make a difference to the lives of people living with severe diseases?” We do that by connecting with patients and their families around the world living with the physical and social burdens of severe disease of the immune system and the central nervous system. Those connections offer new perspectives, drive innovation, and offer the hope of a new generation of therapies that will help to transform lives.