JYX JYVÄSKYLÄN YLIOPISTO UNIVERSITY OF JYVÄSKYLÄ

This is a self-archived version of an original article. This version may differ from the original in pagination and typographic details.

Author(s): Yallum, Kaila M.; Kumpulainen, Tatu

Title: Summer School Report: Jyväskylä Summer School Course on Ultrafast Spectroscopy

Year: 2023

Version: Published version

Copyright: © 2023 Swiss Chemical Society

Rights: CC BY 4.0

Rights url: https://creativecommons.org/licenses/by/4.0/

Please cite the original version:

Yallum, K. M., & Kumpulainen, T. (2023). Summer School Report: Jyväskylä Summer School Course on Ultrafast Spectroscopy. Chimia, 77(11), 797-798. https://doi.org/10.2533/chimia.2023.797

doi:10.2533/chimia.2023.797 Chimia 77 (2023) 797–798 © Swiss Chemical Society

Conference Report

Summer School Report: Jyväskylä Summer School Course on Ultrafast Spectroscopy

Jyväskylä, Finland, August 7–11, 2023

Kaila M. Yallum*[a] and Tatu Kumpulainen*[b]

*Correspondance: K. M. Yallum[a], E-mail: kaila.yallum@unibe.ch; Dr. T. Kumpulainen[b], E-mail: tatu.s.kumpulainen@jyu.fi
[a]Department for Chemistry and Biochemistry, University of Bern; [b]Department of Chemistry/Nanoscience Center, University of Jyväskylä,

Abstract: The 32nd edition of the Jyväskylä Summer School (JSS32) was in high demand for the ultrafast spectroscopy chapter. On August 7–11 2023 nearly 40 students gathered in Jyväskylä to tune in for the JSS32 course entitled Ultrafast Spectroscopy: phenomena, experiments and data analysis methods. The course was coordinated by Senior Lecturer Tatu Kumpulainen and featured lectures each morning from two invited speakers, Prof. Eric Vauthey, University of Geneva, Switzerland, and Assoc. Prof. Jens Uhlig, Lund University, Sweden. In addition to the lectures, the course featured four workshops in the afternoons aimed at introducing the participants to the practical aspects of steady-state and time-resolved spectroscopies. Besides the scientific content, JSS32 offered several social events where participants could network with other participants of the whole summer school.

The sunny Monday morning began with the opening remarks from the course coordinator ***Tatu Kumpulainen***. In his remarks, Tatu first highlighted the international nature of the course. The course had attracted 38 students from 15 different countries representing a total of 19 different nationalities. The furthest participants had traveled all the way to Jyväskylä from USA and India. Tatu also acknowledged the support from several local and international organizations, including Laserlab-Europe, European Photochemistry Association, Photochemistry Section of the Swiss Chemical Society and Alfred Kordelin foundation that enabled participation to the course free of charge.

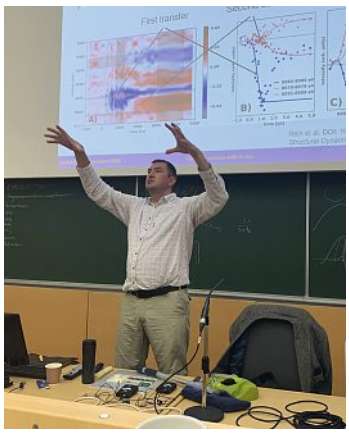
The first guest lecturer, Prof. Eric Vauthey, University of Geneva, Switzerland. © K. Yallum

After the introduction, coffee, and meeting other participants, the lectures began with ***Prof. Eric Vauthey***'s revision of light–matter interactions, laying the foundation for electronic transitions and the spectroscopic methods used to probe the photophysical behavior of molecules and materials. The overview of spectroscopic methods varied from absorption to emission, steady-state to ultrafast, and UV to infrared, providing the key observables each method offered to researchers. Having these tools in mind, Eric explained relaxation, energy transfer, and charge transfer processes that originate in excited molecules. Each process was presented along with case studies and examples of data from each of the methods introduced in the lecture.

The afternoons were filled with hands-on experiences in four different workshops that the groups rotated through. The steady-state spectroscopy workshop took on the format of an escape room, where participants were tasked with calculating the radiative decay rate of an unknown compound with only steady-state absorption and fluorescence techniques at their disposal. Participants bonded in problem solving: finding the code to unlock the cuvettes necessary for the experiment; using a UV lamp to discover the molecular weight of the compound; and exploring the lab to find hidden clues as to the necessary equations and variables.

The FLuorescence UPconversion Spectroscopy (FLUPS), Transient Absorption (TA) and Time Correlated Single Photon Counting (TCSPC) workshops all allowed participants to see a demonstration measurement on home-built setups at the Laserlab-NSC of the University of Jyväskylä. These sessions were preceded by presentations of the operating principals and experimental design for each setup, and they were followed by data analysis workshops.

In the evenings, students could benefit from social and networking events. The welcome event featured the chance to share their work in poster format with a catered dinner. Aline Vanderhaegen from the ultrafast cohort was awarded the best poster presentation for her work on THz spectroscopy. The rest of the social schedule featured a game night, photography, and sauna experiences all organized by the University of Jyväskylä.



The second guest lecturer, Prof. Jens Uhlig, Lund University, Sweden. © K. Yallum

The second half of the week focused on lectures from ***Prof. Jens Uhlig***. Jens spent the first morning to discuss the principals of data analysis of spectroscopic data. He presented his open-source program, KiMoPack, to the participants, explaining the motivation of making singular value decomposition (SVD) a more physical model by using kinetic models as constraints for the SVD. This lecture section was paired with its own afternoon workshop in which Jens helped participants to use KiMoPack on provided example data, or even on their own data sets, demonstrating the broad scope of KiMoPack.

During the rest of his lectures, Jens shared his expertise in X-ray spectroscopy. The lectures focused on everything from the practical realities of synchrotron-based X-ray techniques to the possibilities of table-top, home-built X-ray setups. Jens shared case studies as well, with demonstrative data to explain the rich information about bond distances and energy levels available through X-ray spectroscopy.

By the second half of the week, through the lectures and workshops, the ultrafast cohort grew quite close, and the evenings were filled by self-organized social events and dinners. Some participants went on walks and swims in the plethora of lakes around the beautiful city of Jyväskylä university campus. Some

Group photo of participants taken at the end of the summer school course.

participants took advantage of a nearby water park, and others opted for biking. The end of most evenings ended all together, sharing a moment on the pier of the hotel or in the city. The social aspect served to motivate and inspire all the participants.

The ultrafast spectroscopy summer school at University of Jyväskylä offered a highly engaging week of ultrafast theory and experience to all 38 participants lucky enough to take advantage of this amazing opportunity to network and learn from experts.

Received: September 19, 2023