



**Laudatio for the Award Ceremony
of the Prix Schläfli Mathematics 2021
of the Swiss Academy of Sciences (SCNAT)
for Dr Gabriel Dill**

The Jury of the Prix Schläfli Mathematics 2021 of the Swiss Academy of Sciences (SCNAT), consisting of Professors Jérémy Blanc (University of Basel), Sara van de Geer (ETHZ), Marc Troyanov (EPFL), Norbert Hüngrerbühler (ETHZ), Thomas Studer (University of Bern) has evaluated many excellent applications, and decided unanimously to award the Prix Schläfli in Mathematics 2021 to Dr. Gabriel Dill for his exceptional thesis in diophantine geometry.

Gabriel Dill's PhD contains several remarkable contributions to a particularly ambitious problem: the conjecture on unlikely intersections. This is a sweeping generalisation of such landmark results in diophantine geometry as Faltings' theorem on the Mordell conjecture. His thesis is ambitious and broad in technique, requiring familiarity with the theory of abelian varieties but also o-minimal geometry from model theory. Gabriel Dill's results are surprisingly strong and the thesis contains many original ideas. For example, he needed precise information on the height when varying over a collection of diophantine objects. The height is the key to many insights in the field but is particularly difficult to handle in connection with the Mordell conjecture and its generalisations. In collaboration with Barroero, he completely solved the conjecture on unlikely intersections for any curve in any abelian variety. This is the capstone of more than a decade's worth of progress by several authors. Dill's thesis also contains the seeds for further research that he is pursuing now as a postdoc.

Gabriel Dill obtained his B.Sc. and M.Sc. in Mathematics at the University of Basel in 2013 and 2015, respectively. His grade average was 6.0 (best grade). He then did his Ph.D. thesis from 2016 to 2019, entitled "Unlikely intersections with isogeny orbits" under the supervision of Philipp Habegger, still in Basel, and graduated with the top grade (summa cum laude). Dill found the time to work as a student representative on committees and co-organised a research seminar for the graduate students at our department. Dill was awarded an Early Postdoc.Mobility fellowship from the Swiss National Science Foundation (SNSF), which supports this post-doctoral stay at the University of Oxford, where he is currently working under the mentorship of Prof. Dr. Jonathan Pila.

Prof. Dr Jérémy Blanc, president of the jury of the Prix Schläfli 2021 and of the Swiss Mathematical Society

Award Ceremony, Basel, 15 September 2021



**Laudatio for the Award Ceremony
of the Prix Schläfli Geosciences 2021
of the Swiss Academy of Sciences (SCNAT)
for Dr Fabian Mahrt**

The jury of the Prix Schläfli 2021 in Geosciences of the Swiss Academy of Sciences (SCNAT), consisting of Christine Pümpin (University of Basel), Dr Naki Akcar (University of Bern), and Prof. Olivier Bachmann (ETH Zürich) has evaluated seven high quality applications and proposed to award the prize to Dr Fabian Mahrt for his publication entitled “The Impact of Cloud Processing on the Ice Nucleation Abilities of Soot Particles at Cirrus Temperatures”. The board of the Platform Geosciences then unanimously endorsed the decision of the jury and awarded the Prix Schläfli 2021 in Geosciences to Dr Fabian Mahrt.

Dr Fabian Mahrt obtained his MSc degree in the Institute of Atmospheric and Climate Science, in the Department of Environmental System Science, at the ETH Zurich, and was awarded his PhD degree from the same institute in 2019. His advisors were Prof. U. Lohmann, and Dr Z. A. Kanji. Dr Fabian Mahrt is now a postdoctoral fellow at the University of British Columbia, in Vancouver, Canada.

The study proposed by Dr Fabian Mahrt focussed on the ability of soot particles to nucleate ice crystals, on the role of atmospheric aging of such soot particles, and their ability to contribute to cirrus cloud formation. This study revealed that ice nucleation on soot particles is constrained to temperatures below 233 °K, and to particles larger than ~100 nm in diameter, providing important constraints on the ice nucleation ability of atmospheric soot particles. The study could also demonstrate that Pore Condensation and Freezing (PCF) was a key mechanism for ice nucleation on soot particles.

One particular strength of Dr Mahrt’s publication (and of his general approach to research) is the coupling between instrument development skills and extensive knowledge in atmospheric science. Such an integrative approach allowed the development of novel tools, which provided unique opportunities for advanced experiments, that have already led to follow-up studies. Next to his main research topic, Dr Mahrt also explored other directions, such as (1) the effect of sulfuric acid aging of soot particles on their ice nucleation ability, and (2) the characterization and testing an optical particle phase discriminator, used to discriminate cloud droplets and ice crystals in cloud chamber studies.

The jury of the Prix Schläfli was particularly impressed by Dr Mahrt’s innovative and wide-ranging approach, shedding new light on mechanisms of the very important process of cloud formation, establishing a strong basis for a better understanding of environmental pollution and its influence on the global climate.

I would like to congratulate again Dr Mahrt on his excellent work, and wish him the best of luck for the future.

Prof. Olivier Bachmann, on behalf of the president of the Prix Schläfli 2020 Jury, Christine Pümpin.

Award Ceremony, Geneva, November 2021



Laudatio for the Award Ceremony
of the Prix Schläfli Chemistry 2020
of the Swiss Academy of Sciences (SCNAT)
for Dr Robert Pollice

The Jury of the Prix Schläfli 2019 of the Swiss Academy of Sciences (SCNAT), consisting of Professors C. Bochet (U. Fribourg), T. Bürgi (U. Geneva), C. E. Housecroft (U. Basel, president), K. Koch (PH Bern), L. Nyström (ETHZ), S. Sturia (ETHZ) and O. Wenger

(U. Basel), has decided to award the prize to Dr Murielle Delley for excellence in her research resulting in an article entitled 'Local Structures and Heterogeneity of Silica-Supported M(III) Sites Evidenced by EPR, IR, NMR, and Luminescence Spectroscopies'.

Dr Murielle Delley completed her PhD in Spring 2017 having studied in the research group of Professor Christophe Copéret at the ETH Zurich. She gained the highest distinction for her doctoral degree and was awarded the ETH Medal as well as the D.N. Chorafas Award. Since 2017, she has been a Postdoctoral Fellow with Prof. James M. Mayer at Yale University and has been researching into proton-coupled electron transfer reactions on nanoscale surfaces.

Her doctoral research dealt with the development of single-site chromium-containing catalysts in relation to the Phillips ethylene polymerization, a process which is applied to around half of the world's production of high-density polyethylene. Although this is a modern industrial catalytic process, the structures of the active sites and the mechanisms of polymer chain growth have proved highly elusive despite decades of active research in the area.

The paper for which the Prix Schläfli has been awarded was published in the high impacting Journal of the American Chemical Society in 2017. By grafting molecular precursors onto silica surfaces using either amide or siloxide precursors, Dr Delley was able to observe silica-supported chromium(III) sites which exhibit high activity in alkene polymerization and alkane dehydrogenation. A wide range of spectroscopic methods were applied to analyse the nature of the active species and shed light on hitherto undefined structural features. Whereas the siloxide route leads to pure oxygen environments for chromium, the amide route introduces nitrogen into the chromium(III) coordination sphere. Dr Delley showed that this affects the ability to coordinate CO, and also the behaviour of the supported chromium sites in ethene polymerization, in particular, by forming higher amounts of oligomers and a tendency for branched polymers. The relevance of the results to the industrial ethylene polymerization process makes this research highly exciting and internationally important.

We congratulate Murielle Delley on her achievements and wish her well in her future career.

Prof. Catherine E. Housecroft, Platform Chemistry of the Swiss Academy of Sciences

Award ceremony, 25 February 2020 in Zurich, ETHZ



Laudatio for the Award Ceremony of the Prix Schläfli Biology 2021 of the Swiss Academy of Sciences (SCNAT) for Dr Gregor Weiss

The Jury of the Prix Schläfli (Biology) 2021 of the Swiss Academy of Sciences (SCNAT), consisting of Prof. Dr Roman Ulm (University of Geneva), Prof. Dr Patrick Linder (University of Geneva), and Prof. Dr Oliver Heiri (University of Basel), has reviewed 14 applications. Amongst the many excellent candidates, the jury suggested to award the prize to Dr Gregor Weiss for his achievements in understanding bacterial cell-cell interactions using cryo-electron tomography (cryo-ET) imaging, and, in particular, for his breakthrough study on interactions between uropathogenic bacteria and the human filamentous defensin uromodulin, published in the journal *Science* with the title: 'Architecture and function of human uromodulin filaments in urinary tract infections'.

The board of the Platform Biology has unanimously decided to award the Prix Schläfli Biology 2021 to Dr Gregor Weiss for his key contributions to an interdisciplinary and highly collaborative project revealing the molecular mechanism of how uromodulin filaments interact with uropathogenic *Escherichia coli* cells in human urine and how this contributes to the protective function of uromodulin. Uromodulin is known as the most abundant protein in human urine, forming soluble filaments suggested to counteract the adhesion of uropathogens. In his PhD work, Gregor was able to resolve the first three-dimensional structure of uromodulin. Strikingly, he was even able to visualize the binding of uromodulin with type-1 pili of uropathogenic *E. coli* cells, not only *in vitro*, but also directly in unprocessed urine samples from patients, and could further extend this finding to other uropathogens, such as *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Streptococcus mitis*. Together with his collaborators, Gregor could provide important molecular insight into the mechanism of how uromodulin filaments bind to bacterial pili, clumping together the uropathogens and blocking their adhesion to the epithelium of the urinary tract, ultimately permitting pathogen elimination through urination. The PhD work of Dr Gregor Weiss is a milestone study that represents a key step in the understanding of the protective function of uromodulin in urinary tract infections, and not least, on the technical side regarding cryo-ET development using primary samples, and thus the potential of cryo-ET for example for biomedical imaging, and beyond.

Dr Gregor Weiss studied at the University of Innsbruck, Austria for his BSc in Chemistry, and at the University of Vienna, Austria for his MSc in Biological Chemistry. Then Gregor performed his PhD work in Cellular Structural Biology entitled 'Bacterial cell-cell interactions studied by cryo-electron tomography' at the ETH Zurich's Institute of Molecular Biology & Biophysics, under the supervision of Prof. Dr Martin Pilhofer. Since September 2020, Dr Gregor Weiss is a Project Group Leader at the ETH Zurich.

Prof. Dr Roman Ulm (University of Geneva), Prof. Dr Patrick Linder (University of Geneva), and Prof. Dr Oliver Heiri (University of Basel), members of the board of the Platform Biology of the Swiss Academy of Sciences (SCNAT).

Award Ceremony, 21 April 2022, LS² Annual Meeting.