

Substructural logics: semantics, proof theory, and applications.
Report on the second SYSMICS workshop



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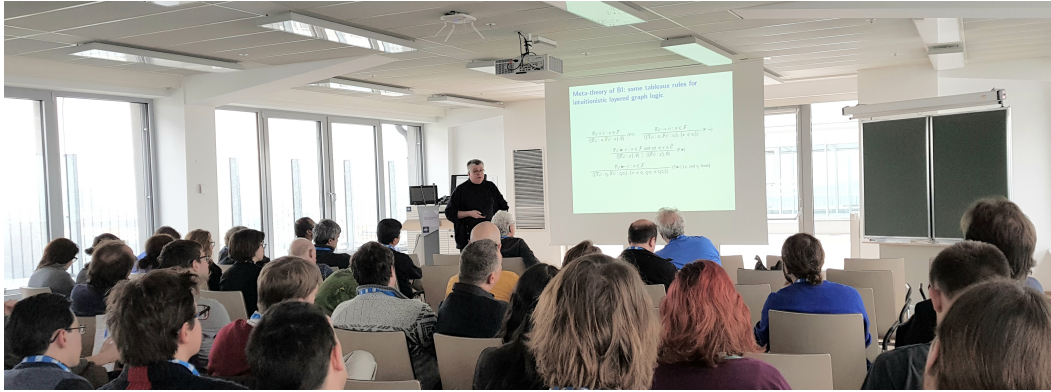
Substructural logics: semantics, proof theory, and applications is the second workshop within the project SYSMICS (Syntax meets Semantics – Methods, Interactions, and Connections in Substructural logics). It was held in Vienna at the Faculty of Mathematics, University of Vienna, from 26 – 28 February 2018.

SYSMICS is a European Marie Skłodowska-Curie RISE Project within the Horizon 2020 framework. The main objective of SYSMICS is to establish a network of collaborations between researchers who investigate substructural logics and to provide a stable basis of cooperation for a large, international community of algebraists, logicians and theoretical computer scientists. The project involves 23 partners from 13 different countries and 6 continents. Additional funding for the workshop was provided by the Vienna Center for Logic and Algorithms (VCLA) and by the Wolfgang Pauli Institute (WPI) Vienna.

The workshop lasted for 3 full days and comprised of 31 talks (including 6 invited talks) and 55 participants from project-partner universities and other universities. A call for abstracts with deadline 15th December 2017 was announced and the 25 contributed talks were selected by the Organising Committee according to the merits of the submitted abstracts.

List of the invited speakers

- Matteo Maffei (TU Wien)
Security and Privacy by Typing in Cryptographic Systems
- Francesco Paoli (Università di Cagliari)
The Archimedean Property: New Horizons and Perspectives
- Elaine Pimentel (Universidade Federal do Rio Grande do Norte)
A unified view of modal and substructural logics
- David Pym (University College London)
Logic as a modelling technology: resource semantics, systems modelling, and security
- Alwen Tiu (Australian National University)
A proof theory for dual nominal quantifiers
- Philip Wadler (University of Edinburgh)
Propositions as sessions

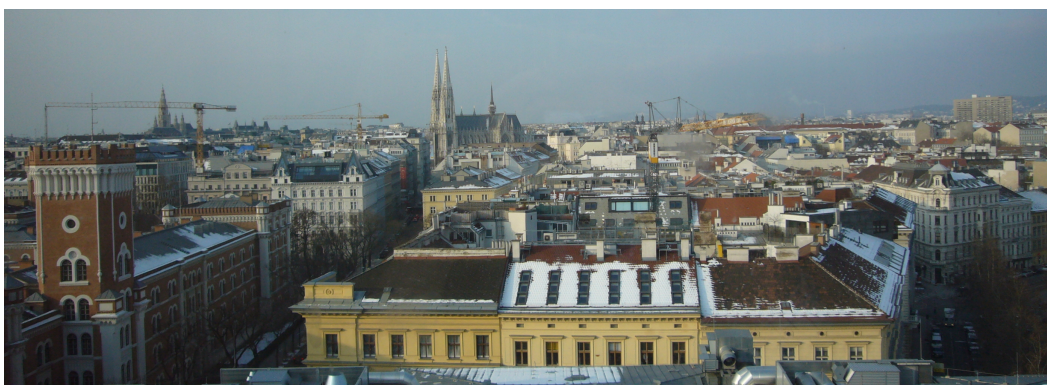


The scientific program of the workshop focused on the interactions between syntactic and semantic methods in substructural and related logics, as well as their applications in Computer Science.

On the first day, various perspectives on the application of logics and type theory to verification and security were explored. Pym talked about bunched logics and their resource semantics. He placed these logics in a broader context of logics that are supported by such semantics, and illustrated their use in a range of modelling applications, including access control, systems security, and workflow simulation. Wadler presented a functional language with session types and a calculus in which communication sessions are typed using propositions of classical linear logic. He then showed a translation of the former into the latter, thus providing a first connection between a standard presentation of session types and linear logic, and showing that the correspondence to linear logic guarantees freedom from deadlocks. Maffei talked about the use of type theory for modelling cryptographic protocols and the potential for establishing bridges with various subdisciplines of interest to the logic, semantics, and verification community (e.g., type theory, SMT solving, linear logic, proof-carrying authorization, relational verification, and concurrent programming).

On the second day, substructural logics were discussed from an algebraic perspective. The talk by Paoli stemmed from the observation that although there have been repeated attempts to define the concept of an Archimedean algebra for individual classes of residuated lattices, there is no all-purpose definition that suits the general case. He presented recent investigations on a general definition of the Archimedean property for residuated lattices.

The focus of the final day of the meeting was on the proof theory of substructural and other non-classical logics. Tiu discussed the problem of embedding π -calculus in linear logic focusing on the interpretation of the restriction operator as a quantifier. In order to tackle this problem, he presented a proof system featuring dual nominal quantifiers and showed how to interpret π -processes using such system. Meanwhile, Pimentel spoke about unifying proof theoretic methods in modal and substructural logics. She encoded the linear nested sequent framework into linear logic, in this way progressing towards the goal of using linear logic as a “universal framework” for specifying modal and substructural logics.



It is a pleasure to note that the invited and contributed talks touched upon many of the current work directions and research interests of the SYSMICS community and the local organising group.

The venue of the meeting was the Skylounge at the Faculty of Mathematics, University of Vienna. This room was memorable for its open lighting and spectacular near-360 degree birds-eye view of the city of Vienna. In particular, excellent views were had of St Stephan's Cathedral, the Viennese forest and the neighbouring hills of Leopoldsberg and Kahlenberg, the Danube Canal and much more.

Although the outdoor terrace was perhaps a little too cold for those less intrepid, ample compensation was found in the plentiful snowfall well observed from the warmth of the room. Another noteworthy feature of this meeting was the on-site Sicilian cuisine lunch catering. This permitted the participants to collaborate on academic matters and socialise over lunch without interruption.



The SYSMICS workshop consisted of an intensive academic program complemented by a vibrant social program. The Social Dinner was held at Restaurant Waldviertlerhof, a traditional venue in operation since 1842. The meeting itself was concluded by a social evening and a Prosecco toast.

Further information about the workshop can be found at the website: <https://sysmics.logic.at>.