Foreword

This booklet contains the program of CLA 2016 – Computational Logic in the Alps – which takes place from September 5 until September 9 in the University Center Obergurgl. CLA consists of four meetings.

- AJSW 2016 – 4th Austria-Japan Workshop on Rewriting / 45th TRS meeting organizers: Nao Hirokawa and Christian Sternagel
- IWC 2016 – 5th International Workshop on Confluence PC chairs: Beniamino Accattoli and Ashish Tiwari
- WST 2016 – 15th International Workshop on Termination PC chairs: Aart Middeldorp and René Thiemann

The program consists of 56 regular talks as well as two competitions and 8 invited talks.

- CoCo 2016 – 5th international confluence competition
- termComp 2016 – 13th international termination and complexity competition
- Patrick Baillot – On a type-based complexity analysis of subrecursive programs
- Arnold Beckmann – Provably total NP search problems of bounded arithmetic
- Ulrich Berger – Program extraction: correctness vs. efficiency
- Reiner Hähnle – Refined resource analysis based on cost relations
- Florent Jacquemard – Some results on confluence: decision and what to do without
- Paul-André Melliès – Five basic concepts of axiomatic rewriting theory
- Silvia Steila – Reverse mathematical bounds for the termination theorem
- Florian Zuleger – Automated complexity analysis with the size-change abstraction

There is a joint social event on Wednesday for all meetings, consisting of a CLA dinner with wine tasting in the evening, preceded by either rafting or a visit to Ötzi-Village and the nearby Stuibenfall.

We wish you an interesting and enjoyable week in Obergurgl!

Martina Ingenhaeff-Falkner
René Thiemann
Benjamin Winder
Practical Informations

- The bus from Innsbruck to Obergurgl will leave on Sunday at 18:15 in front of the airport.
  If you arrive at the train station, take bus line F to go to the airport. You can buy a bus ticket for the F-bus on board or at a ticket machine. If you have a delay, please contact Sebastiaan Joosten (+43 670 2028986).
- Your room will be ready from 15 o’clock on your arrival day.
- Breakfast is served from 7 o’clock until 9 o’clock. Only on Saturday it starts on 6 o’clock.
- The library is available as meeting room.
- For internet access you can either connect to the WiFi “guest” with password “wlpasswordogu”, or you can use your eduroam account.
- The registration fee includes breakfast, two coffee breaks (incl. small cakes), and dinner. At the regular dinners by default only water is served. The preferred way to order other beverages is to let them put on the bill of your room, and pay them on your departure. In case you are sharing a room with another person, please keep in mind what you consumed. For lunch, there are snacks (soup, Wiener Schnitzel, etc.) available at the university center, or you can take a short walk to the village center.
- Excursion
  - We will meet at 9:25 in front of the University Center to enter the bus. The bus for excursions will leave at 9:30 from the University Center.
  - Both excursions include lunch.
  - For rafting please bring your swimming clothes from home. For the excursion, you additionally have to bring a towel, e.g., the one from your bathroom in the University Center.
  - The bus from rafting back to Obergurgl will leave around 14:15.
  - For Ötzi-Village and the Stuibenfalls there will be a guided tour starting at around 10:15. Lunch will be served at 11:45 at “Ötzi Einkehr”. Afterwards there will be free time to further explore Ötzi-Village and the Stuibenfalls. The bus will depart at 15:00 from the parking place at Ötzi-Village.
  - Persons not attending the excursion can indicate on Monday whether they want to have lunch at the University Center or packed lunch on Wednesday.
  - The CLA dinner starts at 7 o’clock in the evening and afterwards there will be the wine tasting.
- You have to leave your room by 10 o’clock on your departure day.
- On Saturday, breakfast starts at 6 o’clock on Saturday. You can checkout starting from 6:45. The bus will leave at 7:30 from the park place of the university center. Please be there a bit earlier for storing your luggage in the bus.
- Receipts can be printed from the registration system. In case of problems, just let us know so that we can send you a PDF.
- In case of problems, you can reach the organizers and the University Center by phone:
  - Martina Ingenhaeff-Falkner (+43 650 3685628)
  - René Thiemann (+43 650 3589769)
  - University Center (+43 512 507 37201)
  The address of the University Center is
  - Universitätzentrum Obergurgl
  - 6456 Obergurgl
  - Austria
Monday, September 5

**LC&A Session 1 (chair: Georg Moser)**
09:00–10:00  Shared invited LC&A talk: Silvia Steila (in front part of lecture hall)
  Reverse mathematical bounds for the termination theorem
10:00–10:30  Thomas Powell (in back part of lecture hall)
  Complexity in Higher types

**WST Session 1 (in front part of lecture hall; chair: Johannes Waldmann)**
10:00–10:30  Christophe Alias, Carsten Fuhs and Laure Gonnord
  Estimation of Parallel Complexity with Rewriting Techniques

10:30–11:00  Coffee break

**LC&A Session 2 (in back part of lecture hall; chair: Stéphane Gimenez)**
11:00–11:30  Manuel Schneckenreither
  Amortized resource analysis meets term rewrite systems
11:30–12:00  Jürgen Giesl
  Lower bounds for runtime complexity of term rewriting
12:00–12:30  Guillaume Bonfante
  On the complexity of regular languages

**WST Session 2 (in front part of lecture hall; chair: Aart Middeldorp)**
11:00–11:30  Alfons Geser, Johannes Waldmann and Mario Wenzel
  Symbolic Enumeration of One-Rule String Rewriting Systems
11:30–12:00  Hans Zantema and Alexander Fedotov
  Nontermination of string and cycle rewriting by automata
12:00–12:30  Thomas Sternagel and Christian Sternagel
  A Characterization of Quasi-Decreasingness

12:30–14:15  Lunch break

**LC&A Session 3 (in back part of lecture hall; chair: Georg Moser)**
15:15–15:45  Michael Schaper
  Term based abstractions

**WST Session 3 (in front part of lecture hall; chair: René Thiemann)**
14:15–15:15  Shared invited WST talk: Reiner Hähnle
  Refined Resource Analysis Based on Cost Relations
15:15–15:45  Hans Zantema, Dennis Nolte and Barbara König
  Termination of Term Graph Rewriting

15:45–16:15  Coffee break

**LC&A Session 4 (in back part of lecture hall; chair: Thomas Powell)**
16:15–16:45  Alexander Maringele
  FLEA dismantlement
16:45–17:45  Shared invited LC&A talk: Ulrich Berger
  Program Extraction: Correctness vs. Efficiency
17:45–18:15  Johannes Waldmann
  Two concrete challenges in complexity analysis of actual Haskell code

**WST Session 4 (in back part of lecture hall; chair: Christian Sternagel)**
16:15–16:45  Cynthia Kop
  Non-deterministic Characterisations

19:00–      Dinner
Tuesday, September 6

**LC&A and WST Session 5 (in front part of lecture hall; chair: Georg Moser)**

08:45–09:30 Termination and complexity competition: start and tool presentations  
*AProVE, CeTA, CoFloCo, Loopus, and VeryMax*

09:30–10:30 Shared invited LC&A talk: Florian Zuleger  
**Automated complexity analysis with the size-change abstraction**

10:30–11:00 **Coffee break**

**LC&A Session 6 (in back part of lecture hall; chair: Thomas Powell)**

11:00–12:00 Invited LC&A talk: Patrick Baillot  
*On a type-based complexity analysis of subrecursive programs*

12:00–12:30 Nao Hirokawa  
**Automated normalization analysis for term rewriting**

**WST Session 6 (in front part of lecture hall; chair: Reiner Hähnle)**

11:00–11:30 Jera Hensel, Jürgen Giesl, Florian Frohn and Thomas Ströder  
**Termination Analysis of Programs with Bitvector Arithmetic by Symbolic Execution**

11:30–12:00 Cristina Borralleras, Marc Brockschmidt, Daniel Larraz, Albert Oliveras, Enric Rodríguez Carbonell and Albert Rubio  
**Proving termination through conditional termination**

12:00–12:30 Florian Frohn, Marc Brockschmidt and Jürgen Giesl  
**Automated Inference of Upper Complexity Bounds for Java Programs**

12:30–14:15 **Lunch break**

**LC&A Session 7 (in back part of lecture hall; chair: Stéphane Gimenez)**

15:00–16:00 Invited LC&A talk: Arnold Beckmann  
**Provably total NP search problems of Bounded Arithmetic**

**WST Session 7 (in front part of lecture hall; chair: Albert Rubio)**

14:15–15:00 Termination and complexity competition: tool presentations and results  
*cycsrs, MultumNonMulta, and NaTT*

15:00–15:30 Florian Frohn, Matthias Naaf, Jera Hensel, Marc Brockschmidt and Jürgen Giesl  
**Lower Runtime Bounds for Integer Programs**

15:30–16:00 Marc Brockschmidt, Sebastiaan Joosten, René Thiemann and Akihisa Yamada  
**Certifying Safety and Termination Proofs for Integer Transition Systems**

16:00–16:30 **Coffee break**

**LC&A Session 8 (in back part of lecture hall; chair: Thomas Powell)**

16:30–17:00 Stéphane Gimenez  
*A simple protocol for parallel computation*

17:00–17:30 Flavien Breuvart  
*On higher-order probabilistic subrecursion*

17:30–18:00 Maria Schett  
*Trees and graphs, sharing and termination*

18:00–18:30 Georg Moser  
**Complexity of acyclic term graph rewriting**

**WST Session 8 (in front part of lecture hall; chair: Jürgen Giesl)**

16:30–17:00 Christian Sternagel  
**The Generalized Subterm Criterion in TTT2**

17:00–17:30 Carsten Fuhs  
**SMT-Based Techniques in Automated Termination Analysis**

17:30–18:00 WST business meeting

19:00– **Dinner**
Thursday, September 8

**IWC Session 1 (chair: Beniamino Accattoli)**

09:00–09:20 Stefan Kahrs and Connor Smith
*Non-omega-overlapping TRSs are UN*

09:20–09:40 Bertram Felgenhauer
*Efficiently Deciding Uniqueness of Normal Forms and Unique Normalization for Ground TRSs*

09:40–10:00 Luis Moraes and Rakesh Verma
*Joinability Reduces to Confluence*

10:00–10:45 Invited talk: Florent Jacquemard
*Some results on confluence: Decision and what to do without*

10:45–11:15 **Coffee break**

**AJSW Session 1 (chair: Akihisa Yamada)**

11:15–11:35 Chengcheng Ji and Masahito Kurihara
*Lazy Evaluation Schemes for Efficient Implementations of Multi-Context Algebraic Reasoning Systems*

11:35–11:55 Takahiro Nagao
*Proving Inductive Validity of Constrained Inequalities*

11:55–12:15 Naoki Nishida
*Heuristics for Proving Termination of Constrained Rewriting Systems via Rule Duplication*

12:15–12:35 Thomas Sternagel
*Operational Termination of Conditional Term Rewriting Systems*

12:35–14:35 **Lunch break**

**IWC Session 2 (chair: Nao Hirokawa)**

14:35–14:55 Franziska Rapp and Aart Middeldorp
*Confluence Properties on Open Terms in the First-Order Theory of Rewriting*

14:55–15:15 Takahito Aoto and Yoshihito Toyama
*Ground Confluence Proof with Pattern Complementation*

15:15–15:55 Confluence Competition

15:55–16:25 **Coffee break**

**AJSW Session 2 (chair: Christian Sternagel)**

16:25–16:45 Julian Nagele
*Analysing GHC Rewrite Rules*

16:45–17:05 Aart Middeldorp
*Abstract Completion Revisited (1)*

17:05–17:25 Nao Hirokawa
*Abstract Completion Revisited (2)*

17:25–17:45 Christian Sternagel
*Mechanized AC-Equivalence Checking in Isabelle/HOL*

17:45–18:05 Vincent van Oostrom
*Confluence and Higher-Order Critical-Pair-Closing Systems*

18:30– **Dinner**
Friday, September 9

IWC Session 3 (chair: Vincent van Oostrom)
09:00–09:45 Invited talk: Paul-André Melliès
   Five Basic Concepts of Axiomatic Rewriting Theory
09:45–10:05 Cyrille Chenavier
   An Algebraic Approach of Confluence and Completion
10:05–10:25 Joerg Endrullis, Jan Willem Klop and Roy Overbeek
   Decreasing Diagrams: Two Labels Suffice
10:25–10:45 Clément Alleaume and Philippe Malbos
   Coherence of quasi-terminating decreasing 2-polygraphs
10:45–11:15 Coffee break

AJSW Session 3 (chair: Temur Kutsia)
11:15–11:35 Bertram Felgenhauer
   Undecidability of Satisfiability in the First-Order Theory of Rewriting
11:35–11:55 Masahiko Sakai
   Programming in the Esoteric Language Malbolge for Obfuscation
11:55–12:15 Cleopatra Pau
   Anti-Unification Algorithm Library and Applications
12:15–12:35 Takahito Aoto
   Semantics and completeness proof of general inductive theorems
12:35–14:35 Lunch break

IWC Session 4 (chair: Bertram Felgenhauer)
14:35–14:55 Julian Nagele, Vincent van Oostrom and Christian Sternagel
   A Short Mechanized Proof of the Church-Rosser Theorem in Nominal Isabelle
14:55–15:15 Thomas Sternagel and Christian Sternagel
   Formalized Confluence of Quasi-Reductive, Strongly Deterministic Conditional TRSs
15:15–15:35 Naoki Nishida
   Notes on Confluence of Ultra-WLL SDCTRSs via a Structure-Preserving Transformation
15:35–15:55 Sayaka Ishizuki, Masahiko Sakai and Michio Oyamaguchi
   Conditions for confluence of innermost terminating term rewriting systems
15:55–16:25 Coffee break

AJSW Session 4 (chair: Aart Middeldorp)
16:25–16:45 Akihisa Yamada
   Reachability for Termination
16:45–17:05 Michio Oyamaguchi
   Confluence of Innermost Reduction is Undecidable for Terminating TRSs
17:05–17:25 Yoshihito Toyama
   Termination of TRS Synthesis by Rewriting Induction
17:25–17:45 Temur Kutsia
   Computing Generalizations in Description Logic EL
17:45–17:50 AJSW business meeting
18:30– Dinner
Sponsors

We are grateful for financial support from our sponsors.

- University of Innsbruck, Vizerektorat für Forschung and International Relations Office
- Hypo Tirol Bank
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