# STACS 2008, 21-23 February 2008

# Proceedings of the 25th International Symposium on Theoretical Aspects of Computer Science

Bordeaux, France, 2008

Edited by: Susanne Albers and Pascal Weil

2008

Published by: IBFI Schloss Dagstuhl
Printed by: Imprimerie de l'Université Bordeaux I
ISBN: 978-3-939897-06-4

Symposium on Theoretical Aspects of Computer Science 2008 (Bordeaux), pp. 1-6
www.stacs-conf.org

# FOREWORD

SUZANNE ALBERS [1] AND PASCAL WEIL [2]

[1] Institut für Informatik, Universität Freiburg
*E-mail address*: salbers@informatik.uni-freiburg.de

[2] LaBRI, Université de Bordeaux, France
*E-mail address*: pascal.weil@labri.fr

The Symposium on Theoretical Aspects of Computer Science (STACS) is held alternately in France and in Germany. The conference of February 21-23, 2008, held in Bordeaux, is the 25th in this series. Previous meetings took place in Paris (1984), Saarbrücken (1985), Orsay (1986), Passau (1987), Bordeaux (1988), Paderborn (1989), Rouen (1990), Hamburg (1991), Cachan (1992), Würzburg (1993), Caen (1994), München (1995), Grenoble (1996), Lübeck (1997), Paris (1998), Trier (1999), Lille (2000), Dresden (2001), Antibes (2002), Berlin (2003), Montpellier (2004), Stuttgart (2005), Marseille (2006) and Aachen (2007).

The interest in STACS has remained at a high level over the past years. The STACS 2008 call for papers led to approximately 200 submissions from 38 countries. Each was assigned to at least three program committee members. The program committee held a 2-week long electronic meeting at the end of November, to select 54 papers. As co-chairs of this committee, we would like to sincerely thank its members and the many external referees for the valuable work they put into the reviewing process. The overall very high quality of the papers that were submitted to the conference made this selection a difficult task.

We would like to express our thanks to the three invited speakers, Maxime Crochemore, Thomas Schwentick and Mihalis Yannakakis, for their contributions to the proceedings.

Special thanks are due to A. Voronkov for his EasyChair software (www.easychair.org) which gives the organisers of conferences such as STACS a remarkable level of comfort; to Ralf Klasing for helping us explore the many possibilities of this brilliant software; to Emilka Bojańczyk for the design of the STACS poster, proceedings and logo; and to the members of the Organizing Committee, chaired by David Janin.

An innovation in this year's STACS is the electronic format of the publication. A printed version was also available at the conference, with ISBN 978-3-939897-06-4. The electronic proceedings are available through several portals, and in particular through HAL and DROPS. HAL is an electronic repository managed by several French research agencies, and DROPS is the Dagstuhl Research Online Publication Server. We want to thank both these servers for hosting the proceedings of STACS and guaranteeing them perennial availability. The rights on the articles in the proceedings are kept with the authors and the papers are available freely, under a Creative Commons license (see www.stacs-conf.org/faq.html for more details).

# Conference organization

## Members of the Program Committee

Manindra Agrawal, *IIT Kanpur*
Susanne Albers, *Freiburg University*, co-chair
Danièle Beauquier, *Paris-12 University, Créteil*
Mikołaj Bojańczyk, *Warsaw University*
Nadia Creignou, *Marseille-3 University*
Anna Gàl, *University of Texas, Austin*
Naveen Garg, *IIT Delhi*
Kazuo Iwama, *Kyoto University*
Juhani Karhumäki, *Turku University*
Hartmut Klauck, *Frankfurt University*
Kamal Lodaya, *IMSc, Chennai*
Christof Löding, *RWTH, Aachen*
Frédéric Magniez, *Paris-11 University, Orsay*
Peter Bro Miltersen, *Aarhus University*
Vahab Mirrokni, *Microsoft Research, Redmond*
Seth Pettie, *University of Michigan, Ann Arbor*
Eric Rivals, *CNRS and Montpellier University*
Nicole Schweikardt, *TU Berlin*
Christian Sohler, *Paderborn University*
Howard Straubing, *Boston College*
Klaus Wagner, *Würzburg University*
Pascal Weil, *CNRS and Bordeaux University*, co-chair

## Members of the Organizing Committee

Véronique Bogati
Bruno Courcelle
David Janin (Local chair)
Mamadou Kante
Ralf Klasing
Olivier Ly
Frédéric Mazoit
Anca Muscholl
Géraud Sénizergues
Igor Walukiewicz
Pascal Weil
Marc Zeitoun

## External reviewers

Scott Aaronson
Mohammad Ali Abam
Sarmad Abbasi
Luca Aceto
Heiner Ackermann
Marcel Ackermann
Isolde Adler
Pavan Aduri
Tatsuya Akutsu
Laurent Alonso
Helmut Alt
Andris Ambainis
Amihood Amir
Reid Andersen
Daniel Andersson
Takahito Aoto
S. Arun-Kumar
V. Arvind
Arash Asadpour
Eugène Asarin
Yossi Azar
Mohsen Bayati
Srečko Brlek
Amitabha Bagchi
Nikhil Bansal
Vince Bárány
Régis Barbanchon
David Barrington
Surender Baswana
Niel de Beaudrap
Mark De Berg
Vincent Berry
Yves Bertot
Alexis Bès
Stephane Bessy
Olaf Beyersdorff
Jean-Camille Birget
Henrik Björklund
Achim Blumensath
Nicolas Bonichon
Glencora Borradaile
Yacine Boufkhad
Mathilde Bouvel
Andreas Brandstädt
Marcus Brazil
Dirk Brendel
Harry Buhrman
Wojciech Buszkowski
Jin-Yi Cai
Cezar Câmpeanu
Arnaud Carayol
Olivier Carton
Jorge Castro
Annie Chateau
Jingchao Chen
Yijia Chen
Victor Chepoi
Giorgos Christodoulou
Joëlle Cohen
Dave Cohen
David Cohen-Steiner
Thomas Colcombet
Éric Colin de Verdière
Robert Cori
Gérard Cornuéjols
Bruno Courcelle
Maxime Crochemore
Artur Czumaj
Deepak D'Souza
Ovidiu Daescu
Hervé Daudé
Jean-Paul Delahaye
Gilles Didier
Catalin Dima
Dominique Barth
Michael Drmota
Stefan Droste
Ioana Dumitriu
Jacques Duparc
Bruno Durand
Herbert Edelsbrunner
Uwe Egly
Patricia Evans
Jean-Claude Fournier
Rolf Fagerberg
Jittat Fakcharoenphol
Stephen Fenner
Thomas Fernique
Matthias Fischer
Fedor Fomin
Christiane Frougny
Hiroshi Fujiwara
Péter Gács
Travis Gagie
Vijay Garg
Cyril Gavoille
Hugo Gimbert
Rodolphe Giroudeau
Christian Glaßer
Daniel Gonçalves
Daniel Gottesman
Chris Gray
Fred Green
Irène Guessarian
Anupam Gupta
Michel Habib
Mohammad HajiAghayi
Vesa Halava
Yijie Han
Xin Han
Tero Harju
Ishay Haviv
André Hernich
Mika Hirvensalo
John Hitchcock
Juha Honkala
Hendrik Jan Hoogeboom
Joseph Horton
Peter Høyer
Szczepan Hummel
Ferran Hurtado
Oscar Ibarra
Keiko Imai
Nicole Immorlica
Hiro Ito
Gábor Ivanyos
Alain Jean-Marie
David Jacobs
Sanjay Jain
David Janin
Jesper Jansson
T.S. Jayram
Peter Jeavons
Fan Jianxi
Pushkar Joglekar
Satyen Kale
Mark Kambites
Makoto Kanazawa
Jarkko Kari
Wong Karianto
Akinori Kawachi
Neeraj Kayal
Julia Kempe
Michael Kerber

Iordanis Kerenidis
Majid Khabbazian
Daniel Kirsten
Felix Klaedtke
Adam Klivans
Johannes Köbler
Jochen Könemann
Eryk Kopczyński
Frédéric Koriche
Artur Korniłowicz
Guy Kortsarz
Michal Koucký
Stephan Kreutzer
Marc van Kreveld
Andrei Krokhin
Manfred Kufleitner
Ravi Kumar
Michal Kunc
Manfred Kunde
Piyush Kurur
Dietrich Kuske
Tomi Kärki
Markku Laine
Christiane Lammersen
Sophie Laplante
Sławomir Lasota
Aurélien Lemay
Leonid Levin
Leonid Libkin
Nutan Limaye
Markus Lohrey
Sylvain Lombardy
Zvi Lotker
Martin Lotz
Jack Lutz
P. Madhusudan
Veli Makinen
Johann Makowsky
Andreas Malcher
Amal Dev Manuel
Marc Kaplan
Brian Marcus
Wim Martens
Dániel Marx
Marios Mavronicolas
Elvira Mayordomo
Frédéric Mazoit
Andrew McGregor
Pierre McKenzie
Ingmar Meinecke
Guy Melançon
Wolfgang Merkle
Antoine Meyer
Friedhelm Meyer auf der Heide
Shuichi Miyazaki
Morteza Monemizadeh
Malika More
Marcin Mucha
Madhavan Mukund
Filip Murlak
Anca Muscholl
Rahul Muthu
S. Muthukrishnan
Phuong Nguyen
Arfst Nickelsen
François Nicolas
Joachim Nieren
Harumichi Nishimura
Damian Niwiński
Richard Nock
Gustav Nordh
Zeev Nutov
Jan Obdržálek
Yoshio Okamoto
Alexander Okhotin
Nicolas Ollinger
Hirotaka Ono
Friedrich Otto
Jérôme Palaysi
Konstantinos Panagiotou
Paritosh Pandya
Paweł Parys
Mihai Pătraşcu
Christophe Paul
Soumya Paul
Elisabeth Pelz
Mati Pentus
Sylvain Perifel
Ion Petre
Ulrich Pferschy
Fabrice Philippe
Jean-Éric Pin
Marcus Pivato
Alexander Rabinovich
Harald Räcke
Prasad Raghavendra
M. Sohel Rahman
Venkatesh Raman
R. Ramanujam
Rudy Raymond
Christian Reitwießner
Eric Rémila
Jochen Renz
Christian Retoré
Pierre-Alain Reynier
Liam Roditty
Heiko Röglin
Lajos Rónyai
Jörg Rothe
Michał Rutkowski
Kalle Saari
Kunihiko Sadakane
Mohammad Safari
Lakhdar Sais
Mohammad Reza Salavatipour
Alex Samorodnitsky
Peter Sanders
Miklos Santha
Rahul Santhanam
Luigi Santocanale
Jayalal Sarma
Srinivasa Rao Satti
Thomas Sauerwald
Saket Saurabh
Nitin Saxena
Nicolas Schabanel
Guido Schäfer
Gilles Schaeffer
Manfred Schmidt-Schauß
Lutz Schröder
Patrice Séébold
Luc Segoufin
Helmut Seidl
Victor Selivanov
Olivier Serre
Micha Sharir
Somnath Sikdar
Sunil Simon
Cristina Sirangelo
Anastasias Sidiropoulos
Michiel Smid
Troels Bjerre Sørensen
Gregory Sorkin
Robert Špalek
Alex Spelten
Magnus Steinby
Bernd Sturmfels
S.P. Suresh
Maxim Sviridenko
Chaitanya Swamy
Antonios Symvonis
Laurent Tichit
Yasuhiko Takenaga

Suguru Tamaki
Hisao Tamaki
Seiichiro Tani
Orestis Telelis
Kavitha Telikepalli
Pascal Tesson
Edouard Thiel
Thomas Thierauf
Wolfgang Thomas
Sebastien Tixeuil
Takeshi Tokuyama
Szymon Toruńczyk
Hélène Touzet
Mathieu Tracol
William Trotter
Mario Valencia-Pabon
Leslie Valiant
Niko Välimäki
Kasturi Varadarajan
Yann Vaxès
Nikolai Vereshchagin
Kumar Neeraj Verma
Daniel Vilenchik
Aymeric Vincent
Berthold Vöcking
Heribert Vollmer
Jan Vondrák
Daria Walukiewicz
Ingo Wegener
Udi Wieder
Prudence Wong
Camille Wormser
Masaki Yamamoto
Shigeru Yamashita
Koichi Yamazaki
Hiroki Yanagisawa
Raphael Yuster
Mariette Yvinec
Stathis Zachos
Konrad Zdanowski
Norbert Zeh
Sandra Zilles
Alexander Zvonkin
Paweł Żyliński

# Table of contents