Proceedings

15th Annual IEEE Conference on 
Computational Complexity
Proceedings

15th Annual IEEE Conference on Computational Complexity

July 4-7, 2000
Florence, Italy

Sponsored by
IEEE Computer Society Technical Committee for Mathematical Foundations of Computing

In cooperation with
ACM SIGACT
EATCS

Computer Society

Los Alamitos, California
Washington  •  Brussels  •  Tokyo
Table of Contents

15th Annual IEEE Conference on Computational Complexity

Preface ................................................................................................................................................................... viii
Committees ........................................................................................................................................................... ix
Ron Book Prize for Best Student Paper ........................................................................................................... x

INVITED TALK
Chair P. Pudlák
Time-Space Tradeoff Lower Bounds for Non-Uniform Computation
P. Beame

SESSION 1
Chair P. Beame
Time-Space Tradeoffs for Nondeterministic Computation ................................................................................. 2
L. Fortnow and D. van Melkebeek
A Lower Bound for the Shortest Path Problem .............................................................................................. 14
K. Mulmuley and P. Shah
Time-Space Lower Bounds for SAT on Uniform and Non-Uniform Machines .................................................. 22
I. Tourlakis

SESSION 2
Chair R. Gavalda
BP \( f \) = \( O \left( L \left( f \right) \right) \) \( ^{1+\epsilon} \) .............................................................................................................................................. 36
O. Giel
The Communication Complexity of Enumeration, Elimination, and Selection .................................................. 44
A. Ambainis, H. Buhrman, W. Gasarch, B. Kalyanasundaram, and L. Torenvliet
The Query Complexity of Order-Finding ........................................................................................................... 54
R. Cleve

SESSION 3
Chair D. Thérien
On the Complexity of Some Problems on Groups Input as Multiplication Tables ............................................. 62
D. Barrington, P. Kadau, K-J. Lange, and P. McKenzie
The Complexity of Tensor Calculus .................................................................................................................. 70
C. Damm, M. Holzer, and P. McKenzie
The Complexity of Verifying the Characteristic Polynomial and Testing Similarity .......................................... 87
T. Hoang and T. Thierauf
SESSION 4
Chair U. Schöning
A Dual Version of Reimer’s Inequality and a Proof of Rudich’s Conjecture
J. Kahn, M. Saks, and C. Smyth
Computational Complexity and Phase Transitions
G. Istrate
An Application of Matroid Theory to the SAT Problem
O. Kullmann

SESSION 5
Chair L. Trevisan
New Bounds for the Language Compression Problem
H. Buhrman, S. Laplante, and P. Miltersen
Combinatorial Interpretation of Kolmogorov Complexity
A. Romashchenko, A. Shen, and N. Vereshchagin
Independent Minimum Length Programs to Translate between Given Strings
N. Vereshchagin and M. Vyugin

TUTORIAL 1
Chair P. Pudlák
A Survey of Optimal PCP Characterizations of NP
L. Trevisan

SESSION 6
Chair A. Razborov
Easiness Assumptions and Hardness Tests: Trading Time for Zero Error
V. Kabanets, Best Student Paper
Dimension in Complexity Classes
J. Lutz
Average Case Complexity of Unbounded Fanin Circuits
A. Jakoby and R. Reischuk

SESSION 7
Chair R. Venkatesan
On the Hardness of 4-Coloring a 3-Colorable Graph
V. Guruswami and S. Khanna
Deciding the K-Dimension is PSPACE-Complete
M. Schaefer
Integer Circuit Evaluation is PSPACE-Complete
K. Yang

SESSION 8
Chair R. Raz
A Separation of Determinism, Las Vegas and Nondeterminism for Picture Recognition
P. Duriš, J. Hromkovič, and K. Inoue
On the Complexity of Intersecting Finite State Automata
G. Karakostas, R. Lipton, and A. Viglas
On the Complexity of the Monotonicity Verification
A. Voronenko

TUTORIAL 2
Chair P. Pudlák

What Complexity and Cryptography Can Teach Each Other
R. Impagliazzo

SESSION 9
Chair R. Impagliazzo

Quantum Kolmogorov Complexity
A. Berthiaume, W. van Dam, and S. Laplante

On the Complexity of Quantum ACC
F. Green, S. Homer, and C. Pollett

Three Approaches to the Quantitative Definition of Information in an
Individual Pure Quantum State
P. Vitanyi

Characterization of Non-Deterministic Quantum Query and Quantum
Communication Complexity
R. de Wolf

Author Index