

FOCS'89 Conference Information

Location The conference will be held at the Sheraton Imperial Hotel, which is located in the Research Triangle Park (RTP) near the Raleigh-Durham International Airport on I-40 at Exit 282 (Page Road exit). (Telephone, inside North Carolina: (800) 222-6503; otherwise: (800) 325-3535). All technical sessions and lunches will be held in the meeting rooms of the Sheraton. The cost for reception, lunches, business meeting, and the banquet is included in the regular registration fee. Student registration fees do not include the banquet. Please note that the registration fee increases sharply as of October 1, 1989, so we encourage early registration.

Accommodations A block of 250 rooms has been reserved (until October 2nd) at the Sheraton Imperial Hotel. Please make reservations directly with the Sheraton using the enclosed form. The October occupancy rate is high, so please register early. Make sure your reservation reaches the Sheraton by 5:00 p.m. on October 2nd to guarantee your accommodation. The prices for rooms are \$83 for a single and \$88 for a double or triple. In order to receive the special negotiated rate for the conference, please identify yourself with the FOCS'89 Conference.

An additional block of rooms has been reserved at the Holiday Inn Raleigh-Durham Airport, located on the west side of Page Road, opposite the Sheraton (approximately a 10 minute walk, 1/2 mile to the Sheraton). The prices of rooms are \$75 for a single, \$80 for a double and \$85 for a triple. Reservations received after October 14th will be provided on a space available basis. For reservations, call (800) HOLIDAY or (919) 941-6000.

Transportation Raleigh-Durham International Airport (RDU) is served by several major airlines including: American, Delta, Eastern, Pan Am, Piedmont, TWA, United and USAir. Taxi fare from the RDU to the Sheraton (a 5-minute trip) is approximately \$5. The Sheraton will send a van to pick up registered guests at RDU (free of charge) if advance notification is given. Discounted airfare rates up to 45% off are available on American Airlines. American Airlines, in conjunction with Avis Rent-A-Car will offer special discount rates for all conference attendees provided they book through American's

Meeting Service Desk. For reservations and information, call (toll free) 1-800-433-1790 and refer to Star File #S03O9GC. Since there is no public transportation in RTP, if you wish to visit Chapel Hill, Durham and/or Raleigh for dining or pleasure, *WE RECOMMEND THAT YOU RENT A CAR!* If you are arriving by car from RDU Airport, follow I-40 West to Exit 282. The Sheraton is to your left, on the south side of I-40.

Things to Do The Sheraton is located in the center of North Carolina's Research Triangle Park (RTP). The Triangle Area is formed by three cities and three major universities: Duke University at Durham, the University of North Carolina at Chapel Hill (UNC), and North Carolina State University at Raleigh. The Microelectronics Center of North Carolina (MCNC) is located in RTP and is a VLSI design and fabrication facility funded by the state of North Carolina; MCNC recently built the 1.1 million transistor, 128 processor BLITZEN chip.

Points of interest in Chapel Hill include: The University of North Carolina (UNC), the oldest existing State University in the country (The Computer Science Department at UNC is located in the new Sitterson Hall), and Franklin Street, adjacent to the UNC campus, the social and economic hub of the city of Chapel Hill. (Franklin Street houses many quaint shops and eateries and is *the night spot* of the Triangle Area.)

Points of interest in Durham include: Duke University, a private university with a beautiful campus featuring Gothic architecture, the impressive Duke University Chapel, the renowned Duke Medical Center and the Sarah P. Duke Memorial Gardens with breath-taking displays of seasonal flowers and shrubbery.

Points of interest in Raleigh (the state capital) include: the Mordecai House and Historic Park, a Greek Revival Mansion built in 1785 (tours are available); the Oakwood Historic District, an intact Victorian neighborhood consisting of 400 homes listed in the National Register, the North Carolina Museum of Art which has a large collection of Renaissance and Baroque Art, and the State Capitol building.

For day trips in North Carolina, we suggest:

The Fearrington House Restaurant and Inn, a plantation style development with lovely gardens built on land that was a 1786 farm in Chatham County; located 8 miles south of Chapel Hill on US Route 15-501 (an approximate one half hour drive from the Sheraton), Fearrington House features a delightful early Sunday supper from 4:30 p.m. to 7:30 p.m.; for reservations, call (919) 542-2121, at least two weeks in advance, or eat in the nearby cafe;

The North Carolina Zoological Park, an excellent indoor-outdoor (African safari fashioned) zoo covering 1,371 acres of land, located 5 miles south of Asheboro, NC on Route 159 off US Route 64 (an approximate one and one half hour drive from the Sheraton);

Reynolds House Museum, a museum of American Art featuring paintings, furniture and costumes and located adjacent to the 125 acre Reynolds Gardens, two miles northwest of Winston-Salem, NC on Route 67 (an approximate two hour drive from the Sheraton);

Old Salem, a restored German town, founded in 1766 by a small group of Moravians; restored buildings include houses, a church, taverns, schools and specialty shops located off I-40, south of the business district in Winston-Salem, NC; and

Pinehurst, the premier golf resort in the U.S. containing 31 excellent golf courses, all within a 15 mile radius; the quaint village of Pinehurst has many charming restaurants, inns and boutiques (located approximately 75 miles south of Raleigh off US Route 1).

If you have more sight-seeing time, a three and one half hour drive east or west will take you to the ocean or mountains, respectively. The coastline of North Carolina is famous for its many beaches along the Outer Banks, and mountain attractions include Mt. Mitchell, the highest mountain in the East, as well as many attractions in Smokey Mountain National Park.

Conference Events A reception will be held on Sunday, October 29th from 8:30 p.m. to 10:30 p.m. in the Empire Room at the Sheraton. There will be a business meeting on Monday, October 30th at 9:30 p.m. to 11:00 p.m. in the Empire Room at the Sheraton. All registered participants are invited. The banquet will be held on Tuesday evening, October 31st in the Ambassador Ballroom at the Washington Duke Inn and Golf Club in Durham at 7:30 p.m. Weather permitting, a pre-banquet wine reception will be held in

the Sarah P. Duke Memorial Gardens at 6:30 p.m.; otherwise, the reception will be held at the Von Canon Hall in the Bryan Center on the Duke Campus.

Proceedings Additional copies of the Symposium Proceedings will be available by advance order only (see Advance Registration Form).

Climate October weather is typically beautiful in the Triangle Area of North Carolina. The average daily temperature reaches 60°F with slightly cooler evening temperatures, but the weather is variable. It is suggested that you get a weather forecast for Raleigh-Durham area before you arrive.

Machtey Award The Machtey Award is presented for the most outstanding paper written by a student or collaboration of students, as judged by the Program Committee. The award includes a grant to help defray expenses incurred in attending the FOCS Symposium. Please consider making a donation to the Machtey Award Fund so that this award tradition can be sustained. All donations should be made payable to the Machtey Award Fund on a separate check and sent with the Advance Registration Form.

Acknowledgements Students' meals were made possible by a grant from the industrial affiliates of SIGACT.

Local Arrangements Chair John Reif, Computer Science Department, Duke University, Durham, NC 27706, (919) 660-6568

Technical Committee Chair Christos Papadimitriou, Department of Computer Science, University of California at San Diego, La Jolla, CA 92037, (619) 534-2086

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Program Committee Chair Zvi Galil, Department of Computer Science, Columbia University, New York, NY 10027, (212) 854-8191

Program Committee Alok Aggarwal, Eric Bach, Zvi Galil, Juris Hartmanis, Charles Leiserson, Rohit Parikh, Nicholas Pippenger, Charles Rackoff, Ray Strong, Robert Tarjan, Mihalis Yannakakis, and Frances Yao

Advance Registration Form

Please send this form or a facsimile, along with a check or money order, to:

Carol Vilas
Southern Media Design and
Production, Incorporated
P.O. Box 68
Chapel Hill, NC 27514
(Attn: FOCS Registration)

Registration Fee	By 10/1/89	After 10/1/89
IEEE or SIGACT Members	\$200	\$300
Nonmembers	\$275	\$375
Students	\$75	\$100
Additional Proceedings	\$25	
(Available by Advance Order Only!)		

Machtey Fund Contribution \$_____

Make checks payable to "Duke University/FOCS 1989" and to the "Machtey Fund". Requests for refunds will be honored until October 1, 1989.

Name_____

Affiliation_____

City_____State_____Zip_____

Country_____Phone_____

Email_____

Dietary restriction: ☐ Kosher ☐ Vegetarian

Hotel Registration Form

Reservations should be made by October 2, 1989. To make reservations by phone, use the following toll-free numbers:

Sheraton Imperial Hotel and Towers:

Outside North Carolina 1-800-325-3535

Inside North Carolina 1-800-222-6503

To make reservations by mail, return this form with a check, money order, or credit card information, for the first night's deposit to:

Sheraton Imperial Hotel and Towers
P.O. Box 13099
I-40, Exit 282 at Page Road
Research Triangle Park, NC 27709

Sheraton Imperial Hotel and Towers

All major credit cards are accepted. Deposits will be refunded if the hotel is notified 24 hours or more before your specified arrival. Please advise the hotel of late arrival.

☐ Single \$83

☐ Double \$88

☐ Triple \$88

Name_____

Street_____

City_____State_____Zip_____

Arrival/Departure Dates_____

Sharing room with_____

Credit Card (if used)_____

Name on Credit Card_____

Credit Card No._____

Expiration Date of Card_____

Program

Sunday, October 29, 1989

Reception, 8:30pm–10:30pm, Empire Room

Monday, October 30, 1989

Session 1A, 8:45am–10:20am

Chair: Zvi Galil, Columbia University, Tel-Aviv University

- 8:45 *Simulating $(\log^c n)$ -wise Independence in NC* Bonnie Berger and John Rompel, MIT
- 9:10 *The Probabilistic Method Yields Deterministic Parallel Algorithms* Rajeev Motwani and Joseph Naor, Stanford; Moni Naor, IBM, San Jose
- 9:35 *Dispersers, Deterministic Amplification, and Weak Random Sources* A. Cohen and A. Wigderson, Hebrew University
- 10:00 *On Universal Classes of Fast High Performance Hash Functions, Their Time-Space Tradeoff, and Their Applications* Alan Siegel, Stanford and Courant

Session 1B, 8:45am–10:20am

Chair: Mihalis Yannakakis, AT&T Bell Labs

- 8:45 *The Strength of Weak Learnability* Robert E. Schapire, MIT
- 9:10 *A Theory of Learning Simple Concepts Under Simple Distributions* Ming Li, York; Paul M.B. Vitanyi, Centrum voor Wiskunde en Informatica and Amsterdam University
- 9:35 *Generalizing the PAC Model: Sample Size Bounds From Metric Dimension-based Uniform Convergence Results* David Haussler, U.C. Santa Cruz
- 10:00 *Learning Binary Relations and Total Orders* Sally A. Goldman, Ronald L. Rivest, Robert E. Schapire, MIT

Coffee break, 10:20am–10:40am

Session 2A, 10:40am–12:15pm

Chair: Alok Aggarwal, IBM Yorktown

- 10:40 *Efficient NC Algorithms for Set Cover with Applications to Learning and Geometry* Bonnie Berger, John Rompel, MIT; Peter Shor, AT&T Bell Labs

- 11:05 *Fast Matching Algorithms for Points on a Polygon* Odile Marcotte, Quebec; Subhash Suri, Bellcore
- 11:30 *Ensemble Motion Planning on Trees* Greg N. Frederickson and D.J. Guan, Purdue
- 11:55 *An Upper Bound on the Number of Planar k -Sets* János Pach, Hungarian Academy and Courant; William Steiger, Rutgers; Endre Szemerédi, Rutgers and Hungarian Academy

Session 2B, 10:40am–12:15pm

Chair: Eric Bach, Wisconsin

- 10:40 *The Inverse of an Automorphism in Polynomial Time* Matthew Dickerson, Cornell
- 11:05 *Tests and Algorithms for Permutation Polynomials* Joachim von zur Gathen, Toronto
- 11:30 *Computing Irreducible Representations of Finite Groups* László Babai, Eötvös and Chicago, Lajos Rónyai, Hungarian Academy and Chicago
- 11:55 *Galois Groups and Factoring Polynomials Over Finite Fields* Lajos Rónyai, Hungarian Academy and Chicago

Lunch, 12:20pm–2:00pm

Session 3A, 2:00pm–4:05pm

Chair: Robert Tarjan, Princeton

- 2:00 *Efficient Algorithms for Independent Assignment on Graphic and Linear Matroids* Harold Gabow and Ying Xu, Colorado at Boulder
- 2:20 *Flow in Planar Graphs with Multiple Sources and Sinks* Gary L. Miller, USC, CMU; Joseph Naor, Stanford, USC
- 2:40 *A Randomized $O(nm + n^2(\log n)^4)$ Maximum Flow Algorithm* Joseph Cheriyan and Torben Hagerup, Universität des Saarlandes
- 3:05 *Graph Products and Chromatic Numbers* Nathan Linial, IBM, Hebrew University, Stanford; Umesh Vazirani, U.C. Berkeley
- 3:25 *Lower Bounds for the Stable Marriage Problem and its Variants* Cheng Ng, U.C. Irvine
- 3:45 *Approximation Schemes for Constrained Scheduling Problems* Leslie A. Hall and David Shmoys, MIT

Session 3B, 2:00pm–4:05pm

Chair: Rohit Parikh, City University of New York

- 2:00 *Datalog Vs. First-Order Logic* Miklos Ajtai, IBM Almaden;
Yuri Gurevich, Michigan, Ann Arbor
- 2:20 *Decidability and Expressiveness for First-Order Logics of Prob-
ability* Martin Abadi, DEC Systems Research; Joseph Halpern,
IBM Almaden
- 2:40 *Characterizations of the Feasible Functionals of Finite Type*
Stephen Cook and Bruce Kapron, Toronto
- 3:05 *The 0-1 Law Fails for the Class of Existential Second Order
Gödel Sentences with Equality* Leszek Pacholski and Wiesław
Szwast
- 3:25 *A Really Temporal Logic* Rajeev Alur and Thomas Hen-
zinger, Stanford
- 3:45 *Full Abstraction for Nondeterministic Dataflow Networks* James
Russell, Cornell

Coffee break, 4:05pm–4:25pm

Session 4A, 4:25pm–6:00pm

Chair: Charles Leiserson, MIT

- 4:25 *Efficient Tree Pattern Matching* S. Rao Kosaraju, Johns
Hopkins
- 4:50 *Pipelining Computations in a Tree of Processors* S. Rao
Kosaraju, Johns Hopkins
- 5:15 *Sorting on a Parallel Pointer Machine with Applications to
Set Expression Evaluation* Michael T. Goodrich and S. Rao
Kosaraju, Johns Hopkins
- 5:40 *Recursive *-Tree Parallel Data-Structure* Omer Berkman
and Uzi Vishkin, Tel Aviv and Maryland, College Park

Session 4B, 4:25pm–6:00pm

Chair: Juris Hartmanis, Cornell

- 4:25 *Computational Complexity of Roots of Real Functions* Ker-I
Ko, SUNY Stony Brook
- 4:50 *On the Complexity of Fixed Parameter Problems* Karl Abra-
hamson, Washington State, Pullman; John Ellis, Victoria;
Michael Fellows, Idaho, Moscow; Manuel Mata, Victoria

- 5:15 *Structure in Locally Optimal Solutions* Mark Krentel, Rice
- 5:40 *Decision Versus Search Problems in Super-Polynomial Time*
Russell Impagliazzo, U.C. Berkeley; Gábor Tardos, Eötvös
and Chicago

Business meeting, 9:30pm–11:00pm, Empire Room

Tuesday, October 31, 1989

Session 5A, 8:45am–10:20am

Chair: Charles Rackoff, Toronto

- 8:45 *One-way Functions are Essential for Complexity Based Cryptography* Russell Impagliazzo U.C. Berkeley; Michael Luby, ICSI, Berkeley
- 9:10 *Efficient Cryptographic Schemes Provably as Secure as Subset Sum* Russell Impagliazzo, U.C. Berkeley; Moni Naor, IBM Almaden
- 9:35 *Lower Bounds for Pseudorandom Number Generators* Michael Kharitonov and Andrew Goldberg, Stanford; Moti Yung, IBM Yorktown
- 10:00 *How to Recycle Random Bits* Russell Impagliazzo and David Zuckerman, U.C. Berkeley

Session 5B, 8:45am–10:20am

Chair: Rohit Parikh, City University of New York

- 8:45 *The Weighted Majority Algorithm* Nick Littlestone, Harvard; Manfred Warmuth, U.C. Santa Cruz
- 9:10 *On the Complexity of Learning from Counterexamples* Wolfgang Maass, Illinois, Chicago; György Turán, Illinois, Chicago and Hungarian Academy
- 9:35 *The Equivalence and Learning of Probabilistic Automata* Wen-Guey Tzeng, SUNY Stony Brook
- 10:00 *Planning and Learning in Permutation Groups* Amos Fiat, Tel-Aviv; Shahrar Moses, Hebrew University; Adi Shamir and Ilan Shimshoni, Weizmann; Gábor Tardos, Eötvös and Chicago

Coffee break, 10:20am–10:40am

Session 6A, 10:40am–12:15pm

Chair: Alok Aggarwal, IBM Yorktown

- 10:40 *An Optimal Parallel Algorithm for Graph Planarity* Vijaya Ramachandran, Texas at Austin; John Reif, Duke
- 11:05 *Efficient Parallel Algorithms for Testing Connectivity and Finding Disjoint s-t Paths in Graphs* Samir Khuller, Cornell; Baruch Schieber, IBM Yorktown
- 11:30 *The Parallel Complexity of the Subgraph Connectivity Problem* Lefteris Kirousis, Patras; Maria Serna, P.U. Catalonia; Paul Spirakis, Courant
- 11:55 *Processor Efficient Parallel Algorithms for the Two Disjoint Paths Problem and for Finding a Kuratowski Homeomorph* Samir Khuller, Stephen Mitchell and Vijay Vazirani, Cornell

Session 6B, 10:40am–12:15pm

Chair: Nicholas Pippenger, University of British Columbia

- 10:40 *Lower Bounds for Algebraic Computation Trees with Integer Inputs* Andrew Chi-Chih Yao, Princeton
- 11:05 *Simplification of Nested Radicals* Susan Landau, Wesleyan
- 11:30 *Generalizing the Continued Fraction Algorithm to Arbitrary Dimensions* Bettina Just, Johann-Wolfgang Goethe, Frankfurt
- 11:55 *The Complexity of Approximating the Square Root* Yishay Mansour, MIT; Baruch Schieber and Prasoon Tiwari, IBM Yorktown

Lunch, 12:20pm–2:00pm

Session 7A, 2:00pm–3:35pm

Chair: Zvi Galil, Columbia University, Tel-Aviv University

- 2:00 *Speeding-up Linear Programming Using Fast Matrix Multiplication* Pravin Vaidya, AT&T Bell Labs
- 2:25 *A New Algorithm for Minimizing Convex Functions Over Convex Sets* Pravin Vaidya, AT&T Bell Labs
- 2:50 *Asymptotically Fast Algorithms for Spherical and Related Transforms* James Driscoll and Dennis Healy, Dartmouth
- 3:15 *Interior-Point Methods in Parallel Computation* Andrew Goldberg and Serge Plotkin, Stanford; David Shmoys, MIT; Éva Tardos, MIT, Eötvös

Session 7B, 2:00pm–3:35pm

Chair: Ray Strong, IBM Almaden

- 2:00 *Polynomial End-To-End Communication* Baruch Awerbuch and Yishay Mansour, MIT; Nir Shavit, Hebrew University
- 2:25 *Network Decomposition and Locality in Distributed Computation* Baruch Awerbuch, MIT; Michael Luby, ICSI, Berkeley; Andrew Goldberg and Serge Plotkin, Stanford
- 2:50 *Upper and Lower Bounds for Routing Schemes in Dynamic Networks* Moty Ricklin and Yehuda Afek, Tel-Aviv
- 3:15 *The Synchronization of Nonuniform Networks of Finite Automata* Tao Jiang, McMaster University

Coffee break, 3:35pm–4:00pm

Session 8A, 4:00pm–5:35pm

Chair: Charles Leiserson, MIT

- 4:00 *Expanders Might Be Practical: Fast Algorithms for Routing Around Faults on Multibutterflies* Tom Leighton and Bruce Maggs, MIT
- 4:25 *Efficient Simulations of Small Shared Memories on Bounded Degree Networks* Kieran Herley, Cornell
- 4:50 *On the Network Complexity of Selection* C. Greg Plaxton, Stanford
- 5:15 *Power of Fast VLSI Models is Insensitive to Wires' Thinness* Gene Itkis and Leonid Levin, Boston University

Session 8B, 4:00pm–5:35pm

Chair: Mihalis Yannakakis, AT&T Bell Labs

- 4:00 *Towards Optimal Distributed Consensus* Piotr Berman, Chicago; Juan Garay, Penn State; Kenneth Perry, IBM Yorktown
- 4:25 *Privacy and Communication Complexity* Eyal Kushilevitz, Technion
- 4:50 *Solvability in Asynchronous Environments* Benny Chor and Lior Moscovici, Technion
- 5:15 *Multiparty Communication Complexity* Danny Dolev, IBM Almaden; Tomás Feder, Stanford

Banquet, 7:30pm, Ambassador Ballroom, Washington Duke Inn

Wednesday, November 1, 1989

Session 9A, 8:45am–10:20am

Chair: Robert Tarjan, Princeton

- 8:45 *Incremental Planarity Testing* Giuseppe Di Battista, Roma;
Roberto Tamassia, Brown
- 9:10 *Generating Random Spanning Trees* Andrei Broder, DEC
Systems Research
- 9:35 *Using Cellular Graph Embeddings in Solving All Pairs Short-
est Paths Problems* Greg Frederickson, Purdue and ICSI
Berkeley
- 10:00 *An Efficient Parallel Algorithm for the Minimal Elimination
Ordering (MEO) of an Arbitrary Graph* Elias Dahlhaus,
Bonn; Marek Karpinski, Bonn and ICSI Berkeley

Session 9B, 8:45am–10:20am

Chair: Charles Rackoff, Toronto

- 8:45 *On the Complexity of Space Bounded Interactive Proofs* Anne
Condon, Wisconsin, Madison; Richard Lipton, Princeton
- 9:10 *Multiparty Computation with Faulty Majority* Donald Beaver,
Harvard; Shafi Goldwasser, MIT
- 9:35 *Simple Non-Interactive Zero-Knowledge Proofs* Joe Kilian
and Silvio Micali, MIT; Rafail Ostrovsky, Boston University
- 10:00 *On the Power of 2-Way Probabilistic Finite State Automata*
Cynthia Dwork and Larry Stockmeyer, IBM Almaden

Coffee break, 10:20am–10:40am

Session 10A, 10:40am–12:15pm

Chair: Frances Yao, Xerox

- 10:40 *Dynamically Computing the Maxima of Decomposable Func-
tions, with Applications* David Dobkin, Princeton; Subhash
Suri, Bellcore
- 11:05 *Stable Maintenance of Point-set Triangulations in Two Di-
mensions* Steven Fortune, AT&T Bell Labs
- 11:30 *Double Precision Geometry: A General Technique for Calcu-
lating Line and Segment Intersections Using Rounded Arith-
metic* Victor Milenkovic, Harvard

11:55 *Area-Optimal Three-Layer Channel Routing* Ruth Duchem, Aachen; Dorothea Wagner, TU, Berlin; Frank Wagner, FU Berlin

Session 10B, 10:40am–12:15pm

Chair: Juris Hartmanis, Cornell

10:40 *On the Computational Power of PP and $\oplus P$* Seinosuke Toda, University of Electro-Communications, Tokyo

11:05 *An Analogue of the Myhill-Nerode Theorem and Its Use in Computing Finite-Basis Characterizations* Michael Fellows, Idaho, Moscow; Michael Langston, Washington, Pullman

11:30 *Conductance and Convergence of Markov Chains - A Combinatorial Treatment of Expanders* Milena Mihail, Harvard and U.C. Berkeley

11:55 *Lower Bounds for Constant Depth Circuits in the Presence of Help Bits* Jin-yi Cai, Yale

Lunch, 12:20pm–2:00pm

Session 11A, 2:00pm–3:35pm

Chair: Eric Bach, Wisconsin

2:00 *Randomized Search Trees* Cecilia Aragon and Raimund Seidel, U.C. Berkeley

2:25 *On the Complexity of a Game Related to the Dictionary Problem* K. Mehlhorn, St. Näher, and M. Rauch, Universität des Saarlandes

2:50 *Space-efficient Static Trees and Graphs* Guy Jacobson, CMU

3:15 *Twists, Turns, Cascades, Deque Conjecture, and Scanning Theorem* Rajamani Sundar, Courant

Session 11B, 2:00pm–3:35pm

Chair: Nicholas Pippenger, University of British Columbia

2:00 *Probabilistic Communication Complexity of Boolean Relations* Ran Raz and Avi Wigderson, Hebrew University

2:25 *Subquadratic Simulations of Circuits by Branching Programs* Jin-yi Cai, Yale; Richard Lipton, Princeton

2:50 *Constant Depth Circuits, Fourier Transform and Learnability* Nathan Linial, IBM Almaden, Stanford, Hebrew University; Yishay Mansour and Noam Nisan, MIT

3:15 *A Note on the Power of Threshold Circuits* Eric Allender,
Rutgers

Coffee break, 3:35pm–4:00pm

Session 12A, 4:00pm–5:35pm

Chair: Frances Yao, Xerox

4:00 *An Optimal Algorithm for Intersecting Three-Dimensional
Convex Polyhedra* Bernard Chazelle, Princeton

4:25 *On Obstructions in Relation to a Fixed Viewpoint* Ketan
Mulmuley, Chicago

4:50 *Output-Sensitive Hidden Surface Removal* Mark Overmars,
Utrecht; Micha Sharir, Courant and Tel-Aviv

5:15 *Approximation Algorithms for Geometric Embeddings in the
Plane with Applications to Parallel Processing Problems* Mark
Hansen, MIT

Session 12B, 4:00pm–5:35pm

Chair: Ray Strong, IBM Almaden

4:00 *An Optimal Lower Bound on the Number of Variables for
Graph Identification* Neil Immerman and Jin-yi Cai, Yale

4:25 *On Reversal Complexity for Alternating TMs* Maciej Liśkiewicz
and Krzysztof Lorys, Wrocław

4:50 *Extensional Properties of Sets of Time Bounded Complex-
ity* Wolfgang Maass, Illinois at Chicago; Theodore Slaman,
Chicago

5:15 *1-Karp Equivalent Sets are Isomorphic Iff $P = PSPACE$*
Steven Fenner, Stuart Kurtz and James Royer, Chicago