

FOCS '94 The 35th Annual

IEEE Conference on Foundations of Computer Science

November 20–22, 1994

Santa Fe, New Mexico

Sponsored by
The IEEE Computer Society
In cooperation with ACM SIGACT

Registration for FOCS '94

The registration fees for FOCS '94 are listed below. To qualify for the early registration fee, your registration application must be postmarked by **Thursday, October 20**. Refund requests will be honored until November 4. The non-student registration fee includes the Saturday night reception, the Sunday night business meeting, the Monday night banquet, coffee breaks and lunches, and a copy of the proceedings. The student fee includes all of the above except the banquet. Please fill out the form below and send it, along with a check or money order (in US \$, drawn on a US bank) made payable to "IEEE - FOCS '94 Symposium," to:

Sorin Istrail
Attn: FOCS registration
Sandia National Laboratories
Department 1423, Mail Stop 1110
Albuquerque, NM 87185-1110

Name Affiliation Street Address CityState ZIP or
Country & Postal code_____ E-mail_____

Phone_____ Please circle one category

below and fill in your membership number if appropriate:

	Category	Fee	After 10/20
	ACM or SIGACT member	280	335
#	IEEE or EATCS member	280	335
	Author or Program Committee	280	335
	Student	110	130
	Other	300	360

Extra Banquet Tickets ____ ×\$50 each = _____ Total
registration _____ Machtey Fund Contributions (\$5
suggested) _____

(Make separate check to Machtey Award Fund) Dietary

restrictions: Kosher_Vegetarian_None_ Special needs
(attach letter if necessary) _____

Hotel Reservations

The conference will be held at the Eldorado Hotel in Santa Fe. The rates for IEEE FOCS '94 are posted below and apply from Wednesday, November 16 through Thursday, November 24, pre and post days on a space available basis. Checkin time is 4:00 p.m. and checkout is 11:30 a.m. Please advise the hotel of late arrival. Santa Fe is a popular destination; please call soon. Reservations should be made by **Wednesday, October 5**. Reservations made after that will be accepted on a rate and space availability basis. Refer to IEEE FOCS '94 when making reservations to obtain the rates listed. To make your reservations by phone, call 1-800-955-4455 or 505-988-4455 or fax 505-988-5376. To make reservations by mail or fax, fill out the form below and send it to the address below. A deposit in the form of a check or money order for one night's stay, or credit card information and your return phone and/or fax must be included. When filling out the form, make sure that you list your name exactly as it appears on your check or credit card. The following credit cards are accepted: American Express, Diners Club, Visa, Mastercard, and Discover. Deposits will be refunded if the hotel is notified at least 72 hours before your specified arrival.

Eldorado Hotel
Attn: IEEE FOCS '94 Reservations
309 West San Francisco
Santa Fe, NM 87501

Please check one: Single \$85 Double \$95 . Arrival

Date: __Departure Date: __ Please fill out: Name__

Address__ __ Fax:__Phone__ Sharing room with

If paying for deposit by credit card please complete:

Credit Card Type_ Credit Card Number_ Expiration

Date_____ I authorize Eldorado

Hotel to charge the above account for the amount equal to one night's stay as deposit. Signature_____

SATURDAY, NOVEMBER 19, 1994
Outdoor Activity (see Optional Events)
Reception: 8 pm–11 pm, Eldorado Hotel

SUNDAY, NOVEMBER 20, 1994

Sunday Session 1a – chair L. Lovasz

Approximate Graph Coloring by Semidefinite Programming: David Karger, Rajeev Motwani, Madhu Sudan. *Finding Separator Cuts in Planar Graphs Within Twice the Optimal:* Naveen Garg, Huzur Saran, Vijay V. Vazirani. *Polynomial Time Randomized Approximation Schemes for the Tutte Polynomial of Dense Graphs:* Noga Alon, Alan Frieze, Dominic Welsh. *A Note on the θ Number of Lovasz and the Generalized Del-sarte Bound:* Mario Szegedy

9005 Sunday Session 1b – chair A. Blum

An Efficient Membership-Query Algorithm for Learning DNF with Respect to the Uniform Distribution: Jeffrey Jackson. *On Learning Discretized Geometric Concepts:* Nader H. Bshouty, Zhixiang Chen, Steven Homer. *PAC Learning with Irrelevant Attributes:* Aditi Dhagat, Lisa Hellerstein. *The Power of Team Exploration: Two Robots Can Learn Unlabeled Directed Graphs:* Michael A. Bender, Donna K. Slonim.

9005 Break: 10:40 am – 11:10 am

Plenary session I: 11:10 – 12:10

Chair: M. Yannakakis

**Algorithmic Number Theory -
The Complexity Contribution**
Leonard Adelman , USC

Lunch: 12:10 am – 1:45 pm

Sunday Session 2a – chair V. Shoup

On the Power of Quantum Computation: Daniel R. Simon. *Algorithms for Quantum Computation: Discrete Log and Factoring:* Peter W. Shor. *The Complexity of the A B C Problem Resolved:* Jin-Yi Cai, Richard J. Lipton, Yechezkel Zalcstein. *Efficient Average-Case Algorithms for the Modular Group:* Jin-Yi Cai, W.H.J. Fuchs, Dexter Kozen, Zicheng Liu.

3:00 Sunday Session 2b – chair E. Tardos

Finding the k Shortest Paths: David Epstein. *Long Tours and Short Superstrings:* S. Rao Kosaraju, James K. Park, Clifford Stein. *Maximum (s,t)-Flows in Planar Networks $O(|V| \log |V|)$:* Karsten Weihe. *Estimating the Size of the Transitive Closure in Linear Expected Time:* Edith Cohen.

3:00 Break: 3:25 pm – 3:45 pm

Sunday Session 3a – chair F. Meyer auf der Heide

Rapid Rumor Ramification: Approximating the Minimum Broadcast Time: R. Ravi. *The Load, Capacity and Availability of Quorum Systems:* Moni Naor, Avishai Wool. *Fast and Lean Self-Stabilizing Asynchronous Protocols:* Gene Itkis, Leonid Levin. *Local Optimization of Global Objectives: Competitive Distributed Deadlock Resolution and Resource Allocation:* Baruch Awerbuch, Yossi Azar.

3:00 Sunday Session 3b – chair A. Condon

(De)randomized Construction of Small Sample Spaces in NC: David R. Karger, Daphne Koller. *Computing with Very Weak Random Sources:* Aravind Srinivasan. David Zuckerman. *A New Technique for Sampling with Low Randomness:* M. Bellare, J. Rompel. *Robust Functional Equations with Applications to Self-testing/Correcting:* Ronitt Rubinfeld.

3:00 End of technical sessions

9:00 Business Meeting

MONDAY, NOVEMBER 21, 1994

Monday Session 1a – chair J. Hastad

A Lower Bound for the Monotone Depth of Connectivity: Andrew Chi-Chi Yao. *Efficient Oblivious Branching Programs for Threshold Functions:* Rakesh Kumar Sinha, Jayram Thathachar. *Products and Help Bits in Decision Trees:* Noam Nisan, Steven Rudich, Michael Saks. *On Rank vs. Communication Complexity:* Noam Nisan, Avi Wigderson.

9:00 Tuesday Session 1b – chair S. Rao

On the Design of Reliable Boolean Circuits that Contain Partially-Unreliable Gates: Dan Kleitman, Tom Leighton, Yuan Ma. *Nearly Tight Bounds for Wormhole Routing:* Abhiram G. Ranade, Saul Schleimer, Daniel Wiklerson. *Scheduling Multithreaded Computations by Work Stealing:* Robert D. Blumofe, Charles E. Leiserson. *Fast and Feasible Periodic Sorting Networks of Constant Depth:* Mirosław Kutylowski, Krzysztof Lorys, Brigitte Oesterdiekhoff, Rolf Wanka.

9:00 Break: 10:40 am – 11:10am

Plenary session II: 11:10 – 12:10

Chair: S. Goldwasser

Result Checking: A Theory of Testing Meets A Test of Theory

Manuel Blum, UC Berkeley

Lunch: 12:10 pm – 1:45 pm

Monday Session 2a – chair H. Karloff

Beyond Competitive Analysis: Elias Koutsoupias, Christos H. Papadimitriou. *A Theory of Competitive Analysis for Distributed Algorithms:* Miklos Ajtai, James Aspnes, Cynthia Dwork, Orli Waarts. *On-line Admission Control and Circuit Routing for High Performance Computing*

and Communication: Baruch Awerbuch, Rainer Gawlick, Tom Leighton, Yuval Rabani. *IP Over Connection-Oriented Networks and Distributional Paging*: Carsten Lund, Steven Phillips, Nick Reingold.

3:00 Monday Session 2b – chair O. Goldreich

Computationally-Sound Proofs: Silvio Micali. *On Monotone Formula Closure of SZK*: Alfredo De Santis, Giovanni Di Crescenzo, Giuseppe Persiano, Moti Yung. *On the Complexity of Bounded-Interaction and Noninteractive Zero-Knowledge Proofs*: Joe Kilian. *Reducibility and Completeness In Multi-Party Private Computations*: Eyal Kushilevitz, Silvio Micali, Rafail Ostrovsky.

3:00 Break: 3:25 pm – 3:45 pm

Tuesday Session 3a – chair M. Yannakakis

Go With the Winners: David Aldous, Umesh Vazirani. *Randomized Simplex Algorithms on Klee-Minty Cubes*: Bernd Gartner, Gunter M. Ziegler. *Motion Planning on a Graph*: Christos H. Papadimitriou, Prabhakar Raghavan, Madhu Sudan, Hisao Tamaki. *The Localization Problem for Mobile Robots*: Jon Kleinberg.

3:00 Monday Session 3b – chair V. Shoup

Algebraic Computation Trees in Characteristic $p > 0$: Michael Ben-Or. *An $O(n^{1+\epsilon})$ Algorithm for the Complex Roots Problem*: Andrew Neff, John H. Reif. *Complexity Lower Bounds for Computation Trees with Elementary Transcendental Function Gates*: Dima Grigoriev, Nicolai Vorobjov. *On the Computation of Boolean Functions by Analog Circuits of Bounded Fan-in*: György Turán, Farrokh Vatan.

3:00 End of technical sessions

7:30 Banquet – Eldorado Hotel

TUESDAY, NOVEMBER 22, 1994

Tuesday Session 1a – chair L. Lovasz

Expander Codes: Michael Sipser, Daniel A. Spielman. *The Geometry of Graphs and Some Algorithmic Applications*: Nathan Linial, Eran London, Yuri Rabinovich. *Tail Bounds for Occupancy and the Satisfiability Threshold Conjecture*: Anil Kamath, Rajeev Motwani, Krishna Palem, Paul Spirakis. *Priority Encoding Transmission*: Andres Albanese, Johannes Blomer, Jeff Edmonds, Michael Luby, Madhu Sudan.

9:00 Tuesday Session 1b – chair M. Vardi

Graph Connectivity and Monadic NP: Thomas Schwentick. *A Polynomial-Time Algorithm for Deciding Equivalence of Normed Context-Free Processes*: Yoram Hirshfeld, Mark Jerrum, Faron Moller. *On the Combinatorial and Algebraic Complexity of Quantifier Elimination*: Saugata Basu, Richard Pollack, Marie-Francoise Roy. *Set Constraints with Projections are in NEXPTIME*: Witold Charatonik, Leszek Pacholski.

9:00 Break: 10:40 am – 11:10 am

Plenary session III: 11:10 – 12:10

Chair: L. Lovasz

Markov Chains and Polynomial Time Algorithms

Ravi Kannan, CMU

Lunch: 12:10 pm – 1:45 pm

Tuesday Session 2a – chair R. Seidel

1:45 *A Spectral Approach to Lower Bounds*: Bernard Chazelle.

2:10 *Optimal-Work Parallel Algorithms for Higher-Dimensional Convex Hulls*: Nancy M. Amato, Michael T. Goodrich, Edgar A. Ramos.

2:35 *More Output-Sensitive Geometric Algorithms*: Kenneth L. Clarkson.

3:00 *Randomized and Deterministic Algorithms for Geometric Spanners of Small Diameter:* Sunil Arya, David M. Mount, Michiel Smid.

Tuesday Session 2b – chair S. Rao

A New Efficient Radix Sort: Arne Andersson, Stefan Nilsson. *Multi-Index Hashing for Information Retrieval:* Dan Greene, Michal Parnas, Frances Yao. *Optimizing Static Calendar Queues:* Kent B. Erickson, Richard E. Ladner, Anthony LaMarca. *Fully Dynamic Cycle-Equivalence in Graphs:* Monika Rauch.

3:00 **Break: 3:25 pm – 3:45 pm**

Tuesday Session 3a – chair E. Tardos

Maximum Agreement Subtree in a Set of Evolutionary Trees - Metrics and Efficient Algorithms: Dmitry Kesselman, Amihod Amir. *Optimal Evolutionary Tree Comparison by Sparse Dynamic Programming:* Martin Farach, Mikkel Thorup. *Tractability of Parameterized Completion Problems on Chordal and Interval Graphs:* Minimum Fill-in and Physical Mapping: Haim Kaplan, Ron Shamir, Robert E. Tarjan.

3:35 **Tuesday Session 3b – chair A. Condon**

Lower Bounds on Hilbert's Nullstellensatz and Propositional Proofs: Paul Beame, Russell Impagliazzo, Jan Krajicek, Toniann Pitassi, Pavel Pudlák. *Measure on Small Complexity Classes, with Applications for BPP:* Eric Allender, Martin Strauss. *On Syntactic versus Computational Views of Approximability:* Sanjeev Khanna, Rajeev Motwani, Madhu Sudan, Umesh Vazirani.

3:00 **End of program**

Optional Events

FOCS '94 is offering optional tours for Saturday November 19 (see the descriptions below). To participate in a tour, fill out the registration form and return to Santa Fe Destinations. Optional event registration forms MUST be received by 5:00 pm mst, FRIDAY, NOVEMBER 11, 1994. The minimum number of people required for a tour to occur is indicated in the descriptions. If a minimum is not met, the tour will be canceled. If you want to cancel your participation in a tour, cancellation must be received by 5:00 PM MST, Wednesday, November 16, 1994. If participation is cancelled after November 16, you will *still be charged for the tour*. Please visit the Activities Desk near the hotel registration area to check on the tours and to make payment, if you have not already done so. Payment may be made with cash, personal check, money order or may be charged to your room account. If you have any questions about the events, call 505-988-4455, ext. 124. **Historic Walking tour of Santa Fe** Resident historians lead you on a leisurely 2 hour stroll through more than 400 years of history, art and culture of Santa Fe. An extraordinary introduction to the "City Different". Visit the plaza, the Palace of the Governors, St. Francis Cathedral, the Loretto Chapel, and other major Santa Fe historical sites. Includes a visit to lower Canyon Road. \$15.00 per person; 15 person minimum; 2.5 hours. **Bandelier National Monument** Visit Bandelier National Monument, former home of the Anasazi (the "Ancient Ones"). You may walk easy paths past the remains of an ancient pueblo dwelling and climb the ladders to peer inside the cliff dwellings, or take a longer and very scenic hike down Frijoles Canyon to the Rio Grande. A short hike leads to the "kiva", religious center of pueblo life. To enter the kiva will require climbing 3 vertical ladders. \$35.00 per person includes bus, guide, entry fees, and New Mexico state tax; 20 person minimum; approximately 5 hours. We recommend you bring water since the climate is dry and we are at high altitude. Please fill out the form below and send it to:

Eldorado Hotel
Santa Fe Destinations
309 W. San Francisco Street
Santa Fe, NM 87501

or fax form to: 505-988-5376. Include and a check or money order in US \$, drawn on a US bank, if paying that way, made payable to Eldorado Hotel, Santa Fe Destinations.

Please sign me up for the following tours for Saturday, November 19. I understand that if I cancel any activity after November 16, I will still be responsible for payment. Name_____ Affiliation_____ Street Address_____ City, State_____ ZIP or Country & Postal code_____ Phone_____

Tour	Begins At	Cost
Bandelier	12:00 PM	___ ppl ×\$35 each = \$
Walking Tour	2:00 PM	___ ppl ×\$15 each = \$
		Total = \$

General Information

Location: All conference events will take place at the Eldorado Hotel in Santa Fe, New Mexico. Santa Fe is located 60 miles north of Albuquerque, site of the closest major airport. Santa Fe is the second oldest city in the United States. In 1992 it was awarded the "Top destination of the World" award from the readers of Condé Nast Traveler. Although Santa Fe was not listed as a choice on the ballot, the 24,000+ people who participated chose it by write-in. Santa Fe is an art mecca and also offers numerous outdoor activities. **Foreign Currency** We recommend you exchange foreign currency for US dollars before getting to New Mexico. The Albuquerque airport has limited exchange facilities. The United New Mexico bank at the airport is open Monday-Thursday 9 – 3 and Friday 9 – 6 and is closed on the weekend. They exchange currency for only 9 countries. For more information call (505) 765-5267. Banks in Albuquerque are open Saturday till noon. Banks in Santa Fe cannot exchange money on the weekend. The hotel cannot exchange money. **Registration:** The registration desk will be open Saturday, November 19 from 7pm to 10pm and during the conference meeting times. **Accommodations:** A block of rooms has been reserved at the Eldorado hotel at an extremely favorable rate. Reservations must be received by the hotel by October 5. This luxury four diamond hotel has many amenities, including a hot tub and pool on the roof, a new exercise atrium, a massage therapy room and saunas, live entertainment nightly, in-house restaurants (one simple, one fine), modern southwestern decor, and extras in the rooms (such as turkish-towel bathrobes). The hotel is within easy walking distance of the plaza, in the heart of the historic district of Santa Fe. The Eldorado is extremely popular, with bookings made years in advance. We anticipate there will be plenty of rooms available for the nights of November 20 to November 22 (Sunday - Tuesday). There may be a shortage of rooms for the night of Saturday, Nov. 19. In this case, the Eldorado will arrange for a room in one of the conference overflow hotels: The Hilton

or The Hotel Santa Fe, located across the street from the Eldorado. Those who must spend Saturday in an overflow hotel will be able to register at the Eldorado on Saturday night and pick up a key for a room at the Eldorado on Sunday. **Transportation:** The closest major airport is Albuquerque International Airport. Continental Airlines is the "Official Airline of FOCS '94." They offer a variety of discounts for the FOCS 94 participants including: 45% discount off the undiscounted coach fares (standard coach or first class); those are fares that are fully refundable and fully changeable. 5% discount off all other fares, and one complimentary ticket for every 25 passengers. The above discounts are available for travel within the period November 17 - November 25, 1994. For reservations, please call Continental Airlines at 1-800-468-7022 and give them the Z-number of the meeting: ZJ11. They can tell you various other discounts including travel from Canada, Mexico, South America, Central America, Europe, Australia, New Zealand and Japan. **Shuttle Service:** Shuttle Jack provides nonstop service between the Albuquerque airport and Santa Fe. Driving time is 70 minutes. Reservations are required to guarantee seating. Call (505) 243-3244 in Albuquerque or (505) 982-4311 in Santa Fe. When traveling from Albuquerque to Santa Fe, buses depart from the terminal in front of Southwest Airlines at the ground level. When you board the bus tell the driver at which hotel you would like to be dropped off. If you have a problem, call Shuttle Jack inside the terminal at 243-3244 or look for their representative wearing a Red Jacket in the terminal building. Departure times from Albuquerque to Santa Fe are: 6:40 a.m., 8:35 a.m., 12:15 p.m., 1:50 p.m., 3:50 p.m., 5:30 p.m., 8:45 p.m., and 10:45 p.m. When traveling from Santa Fe to Albuquerque, buses leave from any hotel in Santa Fe with advanced confirmed reservations. Pickup time for the Eldorado and the Hilton is 5 min. prior to schedule; departure from outside the main entrance of Eldorado. For Hotel Santa Fe, pickup time is 20 min. prior to schedule; departure from outside the main entrance. When traveling from Santa Fe, if for any reason you are not picked up within 10 minutes of your scheduled time, please call Shuttle Jack immediately at 982-4311. Departure times from Santa Fe to Albuquerque are 4:45 a.m., 6:45 a.m., 9:00 a.m., 11:00 a.m., 1:00 p.m., 3:20 p.m., 6:00 p.m., and 8:40 p.m. You may purchase your ticket from the driver. Shuttle Jack accepts cash or Travelers Checks. The price of a ticket is \$20 each way. You may charge your ticket to VISA or MASTERCARD, but this MUST be done in advance when you make your reservation and can not be done at the time of departure. Alternatively, Twin Hearts Express offers daily service from the Albuquerque Airport Shuttle de-

parting at 3:00 p.m. from Commercial Lane, which is on the second lane outside the airport at baggage claim. A return shuttle leaves Santa Fe at 12:30 p.m. and arrives at the Albuquerque Airport at 2:00 p.m. Ticket price is \$20. Call (505) 751-1201 for reservations and further information. **Airport Hotel:** If you would like to stay overnight in Albuquerque, the Best Western hotel is located right next to the airport. Cost is \$47 for a single and \$54 for a double. Call (505) 242-7022 for reservations and information. **Car Rentals:** Avis Rent-A-Car is the official car rental for FOCS 94. Call 1-800-331-1600 for reservations. The Avis Worldwide Discount Number for IEEE/FOCS 94 is A606095. Avis is an "air partner" with Continental Airlines, the official airline of FOCS 94, and will give special double miles for car rentals taking place in conjunction with a Continental flight. The discounted rates are available one week before and one after the dates of the meeting. They vary from Subcompact at \$33.00/day, \$113.00/week to Premium at \$44.00/day, \$178.00/week. All rates include unlimited mileage. Avis will offer one complimentary one-week car rental for every 20 confirmed reservations using the Avis Worldwide Discount Number for our meeting. **Driving directions:** To drive from Albuquerque Airport to the Eldorado Hotel in Santa Fe:

1. Exit airport directly onto Yale Avenue
2. Left onto Gibson
3. Take Gibson to I-25 North (a right turn right after University)
4. Follow I-25 to Santa Fe exits (approximately 60 miles)
5. Exit onto St. Francis Drive
6. Take St. Francis Drive 3.2 miles to Cerillos Road where you will bear to the right
7. Make a left at the first stop light which is Guadalupe
8. Follow Guadalupe to San Francisco Street
9. Right onto San Francisco Street - The Eldorado is in that block

Parking at the Eldorado hotel costs \$6.95 per day. **Climate:** The weather in Santa Fe is usually pleasant, but can vary greatly at this time of year. Average daily high temperature is 58°F and average low temperature at night is 33°F. There may be snow in the nearby mountains. Santa Fe is over 7000 feet above sea level and the

air is dry. Take care during outdoor activities (bring water, allow time to rest, and dress in layers). **Things to do:** Santa Fe offers a unique combination of cultural events, history, archeology, and outdoor activities. A nonexhaustive list of possible things to do include: hiking, mountain biking, golf (Cochiti Lake Golf Course is one of the most scenic and difficult courses in the USA), tennis, hot air ballooning (New Mexico is one of the best places in the world for hot air ballooning), horseback riding, visit a number of pueblos, ride a steam train, visit ancient ruins, see art galleries and museums (International Museum of Folk Art, Museum of Fine Arts, Museum of Indian Arts and Cultures, Palace of the Governors, El Rancho Golondrinas (living history), The Wheelwright museum of the American Indian, Institute of American Indian Arts, Center for Contemporary Arts, Santa Fe Children's Museum, Indian Arts Research Center, to name a few), walk the plaza, shop, enjoy fine dining, theater, and concerts. Some of the pueblos and natural wonders are a good distance from Santa Fe, but all can be done in a day. If you do not have a rental car, the hotel may be able to arrange tours if there is sufficient interest. Albuquerque is only an hour away and there are also many things to do there: the Rio Grande Zoo (a litter of white tiger cubs was born in August), the Museum of Natural History, the Explora museum (hands-on for children), Albuquerque Children's Museum, the National Atomic Museum, even ice skating. Contact the local arrangement chair for more information or ask at the hotel when you arrive. **Babysitting:** There are two babysitting companies that work with the hotel. Magical Happenings (505-982-9327 or 505-982-1712) offers a walking tour with activities and games (11am to 3pm, for \$35, includes lunch and snack). Personal babysitting also available. Kid Connection (505-471-3100) also offers babysitting services. They have a 3 hour minimum. Cost is a \$5 fee, then \$7 per hour for one or two children, \$1 per hour extra for each additional child. Children in the group need not all be from the same family. If you are interested in combining with other parents to reduce babysitting costs, contact the local arrangements chair and we will attempt to match you. The hotel can also arrange for group activities for children ages 5-12 if there is sufficient interest. Possibilities include: fossil hunting, exploring ruins and caves, making Indian pottery, hands-on lesson from an Indian stone sculptor, and Indian rug weaving. **Conference Events:** A reception will be held at the Eldorado Hotel from 8pm until 11pm on Saturday, November 11. Drinks and hors d'oeuvres will be served. There will be a business meeting on Sunday, November 20, at the Eldorado Hotel. Drinks will be served. The banquet and

lunches Sunday through Tuesday will be served at the Eldorado hotel. **Proceedings:** Additional copies of the proceedings will be sold during the conference at the registration desk. There will also be a limited number of proceedings from FOCS '93 available at a discounted rate. There will be arrangements for shipping proceedings. **Machtey Award:** The Machtey Award is presented for the most outstanding paper (or papers) 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 Symposium. Sandia National Laboratories will provide some financial assistance to all runners-up in the Machtey award competition. Please consider making a donation (\$5 suggested) to the Machtey Award Fund so that this award tradition can be sustained. Use a separate check. **Graduate Student Lottery:** A lottery will be held during the conference to distribute complimentary tickets earned from Continental airlines, complimentary one-week rentals earned from Avis, and complimentary hotel rooms earned from the Eldorado and the Hilton to graduate students attending the conference. Graduate students should sign up at the registration desk. **Local Arrangements Chair:** Sorin Istrail, Sandia National Laboratories, Department 1423, Mail Stop 1110, Albuquerque, NM, 87185-1110. Phone: 505-845-7612. Fax: 505-845-7442, email: [log in to unmask], secretary: 505-845-3658. **Technical Committee Chair:** Allan Borodin, Department of Computer Science, University of Toronto, Toronto, Ontario M5S 1A4, CANADA **Program Committee Chair:** Shafi Goldwasser, Laboratory for Computer Science, Massachusetts Institute of Technology, 545 Technology Square, NE43-330, Cambridge, MA 02139, USA; and Department of Applied Mathematics, Weizmann Institute, Rehovot, Israel. **Program Committee:** Avrim Blum, Anne Condon, Oded Goldreich, Shafi Goldwasser, Johan Håstad, Howard Karloff, Laszlo Lovasz, Yishay Mansour, Friedhelm Meyer auf der Heide, Satish Rao, Raimund Seidel, Victor Shoup, Éva Tardos, Moshe Vardi, and Mihalis Yannakakis.