Annual Report 2000

Work Group

Theoretical Computer Science

(Prof. Dr. Helmut Alt – Prof. Dr. Günter Rote)

January 2001

Institut für Informatik
Fachbereich Mathematik und Informatik
Freie Universität Berlin
Takustraße 9
D–14195 Berlin, Germany

1. **Members of the Group**

(a) Professors

Alt, Helmut, Dr.
Rote, Günter, Dr.

(b) Visiting professors

Lassak, Marek, Prof. Dr. (until March 31st)
Xu, Yinfeng, Prof. Dr. (since November 9th)

(c) Guests

Tóth, Czaba (since December 1st, scholarship holder)

(d) Assistants, scientific personnel, scholarship holders

Braß, Peter, Priv.–Doz. Dr. habil. (Heisenberg scholarship holder)
Felsner, Stefan, Priv.-Doz., Dr. (Freie Universität Berlin)
Heinrich-Litan, Laura (graduate program *Computational Discrete Mathematics*)
Hoffmann, Frank, Dr. (Freie Universität Berlin)
Kaffanke, Astrid (Freie Universität Berlin)
Knauer, Christian (Freie Universität Berlin)
Kortenkamp, Ulrich, Dr. (Freie Universität Berlin)
Kriegel, Klaus, Priv.-Doz., Dr. (DFG - german science foundation)
Meißner, Lutz (Freie Universität Berlin)
Morawe, Nicole (Freie Universität Berlin, until September 30th)
Schönherr, Sven (Esprit project GALIA)
Wenk, Carola (DFG - german science foundation)

(e) Secretary

Heinrich, Hannah (Freie Universität Berlin, until June 30th)
Knoll, Tamara (Freie Universität Berlin, since July 1st)

(f) Coordinator of the graduate program

Felsner, Bettina (DFG)

(g) Student assistants

Arweiler, Irina (DFG, until June 30th)
Rochusch, Dorothea (DFG, until March 31st)
Schultz, Christof (DFG, until May 31st)
Scharf, Ludmila (since March 1st)
Scharf, Leonid (since November 1st)
von Hundelshausen, Felix (from March 1st until April 1st)

2. Guests and Lectures

Peter Widmayer
ETH Zürich (January 24th)
Antennenplazierung im Gelände: Theoretische Komplexität und praktische Lösungen (Antenna Placement in the terrain: theoretical complexity and practical solutions)

Bernd Gärtner
ETH Zürich (February 7th)
Spiele auf natürlichen Zahlen und randomisierte Pivotregeln (Games on natural numbers and randomized pivot rules)

Franz Aurenhammer
Technische Universität Graz (May 8th)
Kantenoperationen auf nichtkreuzenden Spannbäumen (Edge operations on noncrossing spanning trees)

Martin Aigner
Freie Universität Berlin (May 9th)
Was Gauß machte, als er 50 Jahre alt war (What Gauß did, when he was 50 years old)

Kurt Mehlhorn
MPI Saarbrücken (May 9th)
Effiziente Kurvenrekonstruktion mit TSP (Efficient curve reconstruction with TSP)

Emo Welzl
ETH Zürich (May 9th)
n Punkte und eine Gerade (n points and a line)

Alessandro Panconesi
Universität Bologna (June 5th)
The extraordinary career of a trivial algorithm

Konrad Swanepol
Universität of Pretoria (June 19th)
Helly type theorems for non–convex sets

Hal Sudborough
University of Texas at Dallas(October 12th)
Algorithms for Computing Phylogenetic Distances between Species by the Order of their Genes

Christian Krattenthaler
Universität Wien (November 6th)
Über die Abzählung von Tilings, Plane Partitions, und dergleichen mehr (About the counting of tilings, plane partitions, and the like)

Yinfeng Xu
Xi'an Jiaotong University, China (November 13th)
Several Geometric MinMax Problems

3. Projects supported by external grants

- Graduate program Computational Discrete Mathematics
  financially supported by the german science foundation (DFG)

Participating scientists:	Helmut Alt (speaker)
	Günter Rote
Coordination:	Bettina Felsner
Scholarship holders:	Laura Heinrich-Litan
Duration of the project:	October 1991 through September 2000

  This is a joint graduate program of scientists of Freie Universität, Humboldt-Universität, Technische Universität, and Konrad-Zuse-Zentrum.
  Taking into consideration the algorithmic point of view, discrete mathematics has developed from classical fields like combinatorics or graph-theory into a field which unifies aspects of fundamental as well as of applied science in a unique way. Examples are: coding theory and data security, algorithmic number theory and computational algebra, computational geometry and robotics, network planning, design of algorithms – within all these topics, computational discrete mathematics delivers foundations and leads to the applications. The main goal of the graduate program is to work out contributions to important actual questions within the fundamental principles and applications of science by concentrating research and education.

- Graduate program Combinatorics, Geometry, and Computation
  financially supported by the the german science foundation (DFG)

Participating scientists:	Helmut Alt, Günter Rote
Coordination:	Bettina Felsner
Duration of the program:	January 2000 through December 2002

- Project Galia (Geometric Algorithms for Industrial Applications)
  financially supported by the European Community within the ESPRIT IV-Program

Participants:	Helmut Alt (project leader)
	Sven Schönherr
Duration of the project:	November 15th 1998 through May 15th 2000

  Galia ist the continuation project of the project Cgal - Constructing a Geometric Algorithms Library.
  It is a joint project of seven work groups in Utrecht, Zürich, Berlin, Sophia Antipolis/France, Saarbrücken, Trier and Tel Aviv. The main subject of the project is the implementation of the most important algorithms of computational geometry and the corresponding theoretical research.

We aim to create a software package for users of geometric algorithms. This is why the project includes the implementation of applications from fields like Geographical Information Systems (GIS), visualization and simulation, CAD/CAM and pattern-analysis and -reconstruction. The project is planned to be realized in cooperation with several industrial companies of the participating countries.

Our work group joins the implementation of the "Kernel" (elementary geometric objects and algorithms), of optimization algorithms and matching of patterns and shapes.

- Project Point Pattern Matching for the Analysis of Gel Images
  financially supported by the german science foundation (DFG)

Participants:	Helmut Alt (project leader) Klaus Kriegel, Frank Hoffmann, Carola Wenk, Christof Schultz, Irina Arweiler
Duration of the project:	January 1st 1997 through December 31st 2000

This project is a joint project of the Institute of Computer Science of Freie Universität and Deutsches Herzzentrum (german heart center) Berlin. The main topics of research are 2-dimensional gel images, that are produced by high-resolution gelelectophoresis-techniques. The gelelectrophoresis has been established to be a central molecular-biological method for the analysis of the protein/DNA-compound of tissue samples. Each "spot" in a gel image that has been produced by gelelectrophoresis represents one protein appearing in the sample. The analysis of the pictures helps to discover molecular and genetic reasons of heart diseases.

Until now, the interpretation of gel images is mainly based on the exact (and time consuming) examination by experienced specialists. The main goal of the project is to design and implement algorithms for the effective, computer supported gel analysis. Central to our investigations are two steps of this procedure, the gel-matching (assignment of corresponding spots from different pictures) as well as the setup and the administration of a 2-D gel protein database.

The matching represents a very important and time consuming prerequisite for the quantitative and qualitative data analysis of protein images. Within the matching, geometric distortions, that appear when producing protein samples, are to be equilibrated. The corresponding algorithmic problem is a variation of 2-dimensional pattern recognition, where the main difficulty is produced by geometric distortion. The project aims to develop new algorithms for gel-matching, based on already known procedures for point pattern matching from computational geometry. Because of the fundamental nature of the task of approximative point pattern matching, every single progress within the work on this problem will also have great importance for various other applications.

- Project SANO

Participants:	Helmut Alt (project leader) Stefan Felsner, Leonid Scharf, Ludmila Scharf
Duration of the project:	April 1st 1998 through August 31st 2000

This project deals with routing problems. An SAN network connects a set of machines with a set of data storage devices. For each pair (m, s), where m is a machine and s is a strorage device, the required amount of communication between m and s, $b(m, s)$, is given. The goal is to find a routing that keeps the edge weights smaller than the corresponding capacities.

- Project Algorithms for Shape Matching and Approximation
financially supported by the German science foundation (DFG)

Participants:	Helmut Alt (project leader) Christian Knauer, Lutz Meißner, Leonid Scharf, Ludmila Scharf Carola Wenk
Duration of the project:	April 1st 1998 through March 31st 2002

The aim of this project is the development and partial implementation of algorithms for similarity determination and approximation of geometric objects. To achieve this, methods of computational geometry are applied in order to recognize and approximate patterns and shapes. Earlier works of the work group concerning this topic shall be generalized to higher dimensions and to more general transformations for the matching of shapes, e.g. arbitrary affine mappings. In particular, data structures that allow to determine the most similar one out of a fixed set of shapes shall be developed. The practicability of the complex data structures and methods that most of the algorithms contain, as well as the application of approximation-approaches like for example reference-point-methods, shall also be examined.

- ECG – Effective Computational Geometry for Curves and Surfaces
financially supported by the European Community within the 5th framework programme
starting 2001, application and contract preparation in 2000

Participating scientists:	Helmut Alt (project leader) Christian Knauer Ulrich Kortenkamp Carola Wenk

ECG – Effective Computational Geometry for Curves and Surfaces is a continuation project of Galia and CGAL. It is a joint project of six work groups

in Sophia Antipolis (lead contractor), Zürich, Saarbrücken, Tel Aviv, Groningen and Berlin. The main subject will be the special problems arising with the proper handling of curves and curved surfaces in computational geometry.
The project has been accepted by the European Union and will start in 2001.

4. Publications and Lectures

(a) Publications in Journals (with a selection procedure)

H. Alt, S. Felsner, F. Hurtado, M. Noy and E. Welzl. *A class of point-sets with few k-sets. Comp. Geom. Theory and Appl.* 16:95–101, 2000.

P. Brass, C. Wenk. *On the number of cylinders touching a ball.* Geometriae Dedicata 81 (2000), 281–284.

A. Fabri, G.-J. Giezeman, L. Kettner, S. Schirra, S. Schönherr. *On the Design of CGAL, a Computational Geometry Algorithms Library.* Software – Practice and Experience, 30:1167–1202, 2000.

S. Felsner, R. Möhring.
Semi-order dimension two. ORDER 15, 385–390.

S. Felsner, H. Weil. *A Theorem on Higher Bruhat Orders. Discrete & Computational Geometry* 23 (2000), 121–127.

S. Felsner, R. Kant, C. P. Rangan, D. Wagner. *The Complexity of Partial Order Properties. ORDER* 17 (2000), 179–193.

S. Felsner, W. T. Trotter. *Dimension, Graph and Hypergraph Coloring. ORDER* 17 (2000), 167–177.

T. Fleiner, V. Kaibel, G. Rote. *Upper bounds on the maximal number of facets of 0/1-polytopes.* European Journal of Combinatorics, 21:121–130, 2000.

L. Heinrich-Litan, P. Molitor. *Least Upper Bounds for the Size of OBDDs using Symmetries.* IEEE Transactions on Computers, 49:360–368, April 2000.

Jürgen Richter-Gebert and Ulrich H. Kortenkamp. *Euklidische und Nicht-Euklidische Geometrie in Cinderella.* Journal für Mathematikdidaktik, 22:303–324, 2000.

K. Kriegel, I. Seefeldt, F. Hoffmann, C. Schultz, C. Wenk, V. Regitz-Zagrosek, H. Oswald, E. Fleck. *An alternative approach to deal with geometric uncertainties in computer analysis of two-dimensional electrophoresis gels.* Electrophoresis 2000, 21, pages 2637–2640.

(b) Publications in Conference Proceedings (with a selection procedure)

H. Alt, F. Hurtado. *Packing Convex Polygons into Rectangular Boxes.* Proceedings Japanese Conference on Discrete and Computational Geometry, 2000.

P. Brass. *Finding a maximum-cardinality symmetric subset of a planar pointset.* Proceedings Japanese Conference on Discrete and Computational Geometry, 2000.

P. Brass, C. Knauer. *Testing the congruence of d-dimensional pointsets.* SoCG 2000 (16th Annual ACM Symp. Comput. Geom.) ACM-Press 2000, 310–314.

P. Brass. *Exact point pattern matching and the number of congruent triangles in a threedimensional point set.* ESA 2000 (European Symposium on Algorithms), Springer LNCS 1879, 112–119.

R. Conelly, E. D. Demaine, G. Rote. *Straightening polygonal arcs and convexifying polygonal cycles.* In Proceedings of the 41st Annual Symposium on Foundations of Computer Science, Redondo Beach, California. IEEE Computer Society Press, 2000, pp.-432–442.

S. Felsner, F. Hurtado, M. Noy, I. Streinu. *Hamiltonicity and Colorings of Geometric Graphs.* Tagungsband des *ACM-SIAM Symposium on Discrete Algorithms 2000*, 155-164.

S. Felsner. *The Skeleton of a Reduced Word and a Correspondence of Edelman and Greene. Proceedings 12th Conference on Formal Power Series and Algebraic Combinatorics*, 179–190, D. Krob, A.A. Mikhalev and A.V. Mikhalev Eds., Springer Verlag, 2000.

B. Gärtner, S. Schönherr. *An Efficient, Exact, and Generic Quadratic Programming Solver for Geometric Optimization.* In Proc. 16th Annu. ACM Symp. on Computational Geometry, pages 110–118, 2000.

A. Schleich, S. Jovanovic, B Sedlmaier, U. Warschewske, F. Oltmanns, S. Schönherr, W. Oganovsky, B. Ohnesorge, T. Hoell, H. Scherer. *Electromagnetic ENT navigation: the NEN system.* In Proc. 4th Annu. Conf. International Society for Computer Aided Surgery, 2000.

(c) Other Publications

H. Alt. *The Nearest Neighbor.* Editor Helmut Alt, Lectures of the Graduate Program Computational Discrete Mathematics, pages 13–25 ,Berlin, 2000.

H. Alt, L. Guibas. *Discrete Geometric Shapes: Matching, Interpolation, and Approximation.* J.-R. Sack, J. Urrutia, editors, Handbook of Computational Geometry, pages 121–153. Elsevier Science Publishers B.V. North-Holland, Amsterdam, 2000.

P. Brass. *Geometrie in der Mustererkennung.* Mathematik — Interdisziplinär, (J. Flachsmeyer, R. Fritsch, H.-C. Reichel, Eds.), Shaker-Verlag, Aachen, 2000, pages 67–75.

P. Brass, C. Knauer. *Testing the congruence of d-dimension pointsets (Extended Abstract).* In. Proceedings of the 16th European Workshop on Computational Ceometry, Eilat, Israel, pages 104–107, 2000.

S. Felsner. *Interval dimension of a partially ordered set.* In Encyclopedia of Mathematics, Supplement 2, pages 277–278. Kluwer Acad. Publ., 2000.

Jürgen Richter-Gebert and Ulrich H. Kortenkamp. *Cinderella - die interaktive Geometriesoftware.* HEUREKA-Klett Softwareverlag, Stuttgart, January 2000.

Ulrich Kortenkamp. *Foundations of Dynamic Geometry.* Journal für Mathematikdidaktik, 21(2):161–162, 2000.

Ulrich Kortenkamp. *Internetfähige Software fürs Lernen im 21. Jahrhundert.* FU-Nachrichten, (6), June 2000.

Jürgen Richter-Gebert and Ulrich H. Kortenkamp. *Cinderella – Nachmittagssoftware im Unterricht?* Rundgang, Klett-Balmer, Zug, June 2000.

Jürgen Richter-Gebert and Ulrich H. Kortenkamp. *Dynamic aspects in computational geometry.* In Antonio Montes, editor, Proceedings of the EACA 2000, Barcelona, pp 51-61.

Jürgen Richter-Gebert and Ulrich H. Kortenkamp. *Die interaktive Geometry-Software Cinderella.* Springer-Verlag, Heidelberg, December 2000.

Ulrich Kortenkamp. *Kontinuität in dynamischer Geometrie.* In Beiträge zum Mathematikunterricht, pages 358–361. Franzbecker, 2000.

G. Rote. *Division-free algorithms for determinants and Pfaffians: algebraic and combinatorial approaches.* In H. Alt, editor, Lectures of the Graduate Program Computational Discrete Mathematics, pages 59–75, July 2000.

(d) Technical Reports

B 00-02 Peter Brass. *On the monoexistence of Hausdorff–like metrics for fuzzy sets.*

B 00-04 Marek Lassak. *On-line Algorithms for q-adic Covering of the Unit Interval and for Covering a Cube by Cubes.*

B 00-06 Peter Brass, Günter Rote. *Triangles of Extremal Area or Perimeter in a Finite Planar Point Set.*

B 00-08 Marek Lassak. *Relationships between widths of a convex body and of an inscribed parallelotope.*

B 00-10 Vikas Kapoor, Dietmar Kühl, Alexander Wolff. *A Generic Design Concept for Geometric Algorithms.*

B 00-11 Alon Efrat, Frank Hoffmann, Klaus Kriegel, Christof Schultz. *Covering by Ellipses for the Computer Analysis of Protein Patterns.*

B 00-13 Peter Brass, Christian Knauer. *Fast enumeration of point-hyperplane incidendes.*

B 00-15 Stefan Felsner. *Convex drawings of Planar Graphs and the Order Dimension of 3–Polytopes.*

B 00-16 Stefan Felsner,Ferran Hurtado, Marc Noy, Ileana Streinu. *Hamiltonicity and Colorings of Arrangement Graphs.*

B 00-18 Helmut Alt, Stefan Felsner, Ludmila Scharf. *Storage Area Network Optimization.*

B 00-19 Laura Heinich-Litan. *Monotone Subsequences in R^d.*

B 00-20 Peter Brass. *Problems On Approximation By Triangles.*

B 00-21 Peter Brass *On Finding Maximum–Cardinality Symmetric Subsets*

B 00-22 Jürgen Richter–Gebert, Ulrich Kortenkamp *Complexity Issues in Dynamic Geometry*

(e) Talks

Helmut Alt

- *Packing Convex Polygons into Rectangular Boxes*, Lecture of the Graduate Program Combinatorics, Geometry, and Computation, ETH Zürich, May 22nd.
- *Exact Nearest Neighbor Search in High Dimensions*, Computer Science Colloquium, University of Bonn, June 19th.
- *Packing Convex Polygons into Rectangular Boxes*, Seminar Efficient Algorithms, Mathematisches Forschungsinstitut Oberwolfach, August 10th.
- *Geometric Methods for Comparison and Matching of Shapes*, Department of Computer Science, University of Utrecht, Guest Speaker at the Applied Algorithms' Day, September 15th.

Peter Brass

- *Kombinatorische Geometrie und Punktmustererkennung*, Kolloquiumsvortrag an der Universität Ulm, January 27.
- *Approximation of Polygons by Subpolygons*, European Symposium on Computational Geometry, Eilat, Israel, March 13th through 31st.
- *Erkennung dreidimensionaler Punktmuster*, Geometrie-Workshop Greifswald, March 30th through 31st.
- *On Point Sets with Many Small Distances*, Klee-Grünbaum Festival of Geometry, Ein Gev, April 9th through 16th.
- *Combinatorial Geometry Problems with Pattern Recognition Applications*, Discrete Geometry, Oberwolfach, May 28th through June 3rd.
- *Testing the Congruence of d-dimensional Point Sets*, SoCG 2000 (16th Annual Symposium on Computational Geometry), Hong Kong, June 12th through June 14th.
- *Exact point pattern matching and the number of congruent triangles in a three-dimensional point set*, ESA 2000 (European Symposium on Algorithms), Saarbrücken, September 5th through 8th.
- *Über gleichlange Diagonalen in konvexen Polygonen*, DMV-Jahrestagung, Dresden, September 18th through 22nd.
- *Problems on the approximation of polygons*, Kolloquiumsvortrag an der Universität Budapest (Hajos-Seminar), Hungary, October 10th.
- *Combinatorial geometry in pattern matching*, Kolloquiumsvortrag am Renyi-Institut, Budapest, Hungary, October 27th.
- *On sets with many point-hyperplane incidences*, Kolloquium über Kombinatorik, Braunschweig, November 22nd through 25th.

- *Finding maximum-cardinality symmetric subsets of a planar point set*, Japanese Conf. on Discrete and Computational Geometry, Tokyo, Japan, November 22nd through 25th.
- *Combinatorial geometry problems in pattern matching*, Kolloquiumsvortrag am KAIST, Taejon, Korea, November 29th.

Stefan Felsner

- *Ketten in partiellen Ordnungen und Young Tableaux*, Fak. Mathematik und Wirtschaftswissenschaften, Universität Ulm, January 12th.
- *Planare Graphen und Dimension*, Fak. Mathematik und Informatik, Universität Leipzig, April 7th.
- *Zeichnen planarer Graphen und Dimensionen von Polytopen*, Graduiertenkolleg Algorithmische Diskrete Mathematik, Berlin, May 22th.
- *Zeichnen planarer Graphen und Dimensionen von Polytopen*,Graduiertenkolleg Effiziente Algorithmen und Mehrskalenmethoden, Kiel, May 27th.
- *Dimension of Graphs and Poltypes*,Tenth SIAM Conference on Discrete Mathematics, Minneapolis, U.S.A., June, 13th.
- *The Skeleton of a Reduced Word and a Correspondence of Edelmann and Greene*, 12th Conference on Formal Power Series and Algebraic Combinatorics, Moskau, Russia, June, 29th.
- *Infeasibility of Arrangements*, Discrete and Algorithmic Geometry; Euroconference in Mathematics on Crete, Anogie Greece, August, 20th.
- *Planare Graphen und Dimension*, Institut für Geometrie, Technische Universität Braunschweig, September 9th.
- *Inequalities for Linear Extensions and Balancing Pairs*, Wokshop on Search, Sorting and Coding, Bielefeld, October 10th.
- *Infeasibility in Systems of Halfspaces*, Kolloquium über Kombinatorik, Braunschweig, November 17th.
- *Lineare Erweiterungen geordneter Mengen*, Institut für Informatik, Matin–Luther Universität, Halle, December 9th.
- *Zur Kombinatorik von Arrangements*, Institut für Mathematik, Universität Wien, December 13th.

Laura Heinrich-Litan

- *Nächste–Nachbar–Suche in hohen Dimensionen*, Graduiertenkolleg Algorithmische Diskrete Mathematik, Freie Universität Berlin, January 24th.
- *Nächste–Nachbar–Suche in hohen Dimensionen*, ADiMMO Workshop, München, March 30th through 31st.

Frank Hoffmann

- *Covering Simple Polygonal Regions by Ellipses*, Euro CG 2000, Eilat (Israel), .

Astrid Kaffanke

- *Reduzierbarkeit* (Reducibility in PAC Learning), Seminar Algorithmische Lerntheorie, January 14th.
- *Verallgemeinerte Flüsse* (Generalized Flows), Seminar Diskrete Optimierung, July 15th.

Christian Knauer

- *Matching polygonal curves with respect to the Fréchet distance*, Graduiertenkolleg Algorithmische Diskrete Mathematik, Freie Universität Berlin, November 6th.

Ulrich Kortenkamp

- *Workshop: Interaktive Geometrie*, GDM Jahrestagung, Potsdam, March 3rd.
- *Kontinuität in Dynamischer Geometrie*, GDM Jahrestagung, Potsdam, March 3rd.
- *Interactive Geometry*, CMS Math 2000 Meeting, Hamilton, Canada, June 10th.
- *Creating Interactive Geometry with Cinderella*, PIMS Teachers' Workshop, Simon Fraser University, Vancouver, Canada, June 16th.
- *Visions of Geometry on the Net*, LCM, Live collaborative mathematics on the net, CECM, Vancouver, Canada, June 19th.
- *Geometrie am Computer*, BMG Lehrernachmittag, TU Berlin, June 22nd.
- *Entscheidungskomplexität in Dynamischer Geometrie*, DMV Jahrestagung, Dresden, September 22nd.
- *Decision Complexity in Dynamic Geometry*, ADG 2000, Automatic Deduction in Geometry, ETH Zürich, September 27th.
- *The Future of Mathematical Software*, MTCM 2000, Multimedia Tools for Communicating Mathematics, Lissabon, November 24th.
- *Mathematische Grundlagen des Zugmodus in DGS*, RIP-Workshop "Dynamische Geometrie-Software – didaktische und mathematische Aspekte", MFO Oberwolfach, December 14th.
- *Randomisiertes Beweisen in nicht-linearen Situationen*, RIP-Workshop "Dynamische Geometrie-Software – didaktische und mathematische Aspekte", MFO Oberwolfach, December 15th.

Klaus Kriegel

- *Applications of CGAL in the Gel Analysis Software CAROL* GALIA Review Meeting, Bruxelles, September 9th.

Günter Rote

- *Qualitätskontrolle bei Windeln – wie theoretisch ist die theoretische Informatik?*, Freie Universität Berlin, Antrittsvorlesung, January 27th.
- *Can every polycon be untangled?*, 4th Aussois Workshop on Combinatorial Optimization, Aussois, France, March 13th through 17th.
- *Optimal logistics for expeditions – the jeep problem*, A^3DiM^3O-Workshop, München, March 30th trough 31st.
- *Sibson's area-stealing formula and infinitesimal edge unfoldings of polytopes*, Kombinatorische Geometrie, Oberwolfach, May 29th through June 2nd.
- *Good triangulations for random point sets in linear expected time*, Workshop on Probabilistic Methods in Combinatorial Optimization, Aarhus, Denmark, August 28th through September 1st.
- *How to untangle a polygonal chain*, Adam-Mickiewicz-Universität Posen, Poland, October 20th.

– *How to unfold a carpenter's rule*, Mathematisches Seminar, Graduiertenkolleg effiziente Algorithme und Mehrskalenmethoden, Christian-Albrechts-Universität Kiel, November 27th.

Carola Wenk

– *Crossdating in der Dendrochronologie*, 28th Tieftemperatur-Thermodynamik-Kolloquium (TTTK) in Ischgl, Austria, February 19th through 26th.
– *Approximate matching of polygonal curves with respect to the Fréchet distance*, Graduiertenkolleg Algorithmische Diskrete Mathematik, Freie Universität Berlin, November 6th.

5. Courses, Seminars, Exercises and Laboratories (WS 99/00 und SS 00)

H. Alt, G Rote, and other lecturers of the graduate program, *Lectures of the graduate program* Computational Discrete Mathematics, (winter semester 99/00).

H. Alt, C. Knauer, *Entwurf und Analyse von Algorithmen (Design and analysis of algorithms)*, course and exercises (winter semester 99/00).

F. Hoffmann, *Einführung in die Theoretische Informatik (Introduction to theoretical computer science)*, course and exercises, (winter semester 99/00).

K. Kriegel, *Informatik A (Nebenfach)*, course and exercises, (winter semester 99/00).

G. Rote, *Algorithmen und Programmierung III (Algorithms and programming III)*, course and exercises, (winter semester 99/00).

G. Rote, N. Morawe, *Lineare Optimierung (linear optimization)*, course and exercises, (winter semester 99/00).

H. Alt, L. Meissner, *Seminar über Algorithmen (Seminar on algorithms)*, seminar, (winter semester 99/00).

F. Hoffmann, A. Kaffanke, *Algorithmische Lerntheorie (Algorithmic learning theory)*, seminar, (winter semester 99/00).

H. Alt, S. Felsner, G. Rote, *Seminar for M.S. and Ph.D. students in theoretical computer science*, seminar, (winter semester 99/00).

P. Brass, A. Kaffanke, *Praktikum – Raytracing optischer Systeme (Raytracing of optical systems)*, laboratory, (winter semester 99/00).

H. Alt, and other lecturers of the graduate program, *Colloquium of the graduate program* Algorithmic Discrete Mathematics, colloquium, (winter semester 99/00).

H. Alt, C. Knauer, *Algorithmische Geometrie (Computational geometry)*, course and exercises, (summer semester 00).

H. Alt, G. Rote, *Geometric Algorithms for the Analysis of Shapes and Patterns*, block-course and exercises, (summer semester 00).

H. Alt, G. Rote, and other lecturers of the graduate program, *Lectures of the graduate program* Combinatorics, Geometry and Computation, (summer semester 00).

P. Brass, N. Morawe, *Diskrete Geometrie (Discrete geometry)*, course, (summer semester 00).

F. Hoffmann, A. Kaffanke, *String Matching Algorithmen: Theorie und Anwendung (String Matching Algorithms: Theory and practice)*, course and exercises, (summer semester 00).

S. Felsner, *Informatik B*, course and exercises, (summer semester 00).

U. Kortenkamp, *Geometrisches Rechnen (Geometric computing)*, course and exercises, (summer semester 00).

G. Rote, L. Meissner, *Computergrafik*, course and exercises, (summer semester 00).

H. Alt, G. Rote, *Seminar über Algorithmen (Seminar about algorithms)*, seminar, (summer semester 00).

H. Alt, G. Rote, S. Felsner, P. Brass, *Seminar for M.S. and Ph.D. students in theoretical computer science*, seminar, (summer semester 00).

S. Felsner, A. Kaffanke, *Diskrete Optimierung (Discrete optimization)*, seminar, (summer semester 00).

Algorithmen zur Computer-Arithmetik, *G. Rote, C. Knauer*, proseminar, (summer semester 00).

H. Alt, G. Rote, and other lecturers of the graduate program, *Colloquium of the graduate program* Combinatorics, Geometry and Computation, colloquium, (summer semester 00).

6. Organisation of scientific events

GK Fest, June 1st.
Organisation: H. Alt, B. Felsner, H. Heinrich.

Alt–Fest, colloquium on the occasion of the 50th birthday of Prof. Dr. Helmut Alt, break–up of Prof. Alt's course on algorithmic geometry, with talks, May 9th.
Organisation: C. Wenk, B. Felsner.

Fall School on Bioinformatics, Neuseddin, November 6th through 11th.
Organisation: G. Rote
Speakers: Chris Weise (Freie Universität Berlin), Daniel Huson (Celera Genomics Corp., Rockville, Maryland), Jens Stoye (Deutsches Krebsforschungszentrum, Heidelberg), Lorenz Wernisch (Birkbeck College, London)

7. Habilitations

Peter Brass, Umhabilitation an die Freie Universität Berlin

8. Diplomas

Enno Brehm.
3-Orientations and Schnyder 3-Tree-Decompositions
Supervisor: Stefan Felsner.

Emanuel Minetti.
Über die maximale Anzahl der küzesten und zweitkürzesten Abstände in einer endlichen Punktmenge in der Ebene.
About the maximum number of shortest and secondshortest distances in a finiteset of points in the plan.
Supervisor: Peter Braß.

Dorothea Rochusch.
Zufällige Erzeugung von Catalan-Strukturen.
Random generation of catalan-structures.
Supervisor: Stefan Felsner.

Christof Schulz, .
Protein-Spot-Detektion in zweidimensionalen Elektrophorese Gelbildern.
Protein-spot detection in twodimensional electrophoresis gel-images. Supervisors: Helmut Alt, Klaus Kriegel.

9. Miscellaneous

Helmut Alt

- Speaker of the graduate program *Computational Discrete Mathematics*.
- Member of the editorial board of *ORDER*.
- Program committee member *Symposium on Theoretical Aspects of Computing*, STACS 2000, Lille, France.
- Program committee member *European Workshop on Computational Geometr*, CG 2000, Eilat, Israel.
- Program committee member *International Symposium on Algorithms and Computation*, ISAAC 2000, Taipeh, Taiwan.
- Member of the Search Committee for a professorate in Technical Computer Science
- Member of Ph.D. committee for Michiel Hagedoorn, University of Utrecht, The Netherlands
- Member of Ph.D. committee for Dirk Pape, Freie Universität Berlin
- Referee for the research focus program (SPP) *Efficient Algorithms for Discrete Problems and their Applications* of the german science foundation (DFG).
- Referee for journals and conferences.

Peter Brass

- Reelection into the speakers' commitee of the *DMV-special interest group geometry*; operation of their web-sites and electronic newsletter.
- Research stay at the Courant-Institute, New York (three weeks in May).

- Research stay at the Department of Geometry, Eötvös-Loránd University Budapest (two weeks in November)
- Research stay at the Department of Computer Science, KAIST Taejon, Korea (one week in December).
- Referee for *SIAM Journal on Computing.*
- Referee for *Computational Geometry – Theory and Applications.*
- Referee for *Information Sciences.*
- Referee for *ISAAC 2000*
- Referee for *STACS 2001.*
- Reviewer for Zentralblatt der Mathematik.

Stefan Felsner

- Referee for *ICALP 2000*
- Referee for *SIAM Journal of Discrete Mathematics.*
- Referee for *Journal of Information Science and Engeneering.*
- Referee for *Theor. Comp. Sci. A.*
- Referee for *Discrete Mathematics Order.*
- Referee for *Discrete Applied Mathematics.*
- SANO (Ancor Project)
- Member of the habilitation commitee for Stephan Brandt.
- Member of the program committee of *SIAM Conference on Discrete Mathematics 2000.*

Laura Heinrich-Litan

- Referee for *ICALP 2000.*
- Referee for *ISAAC 2000.*
- Participation and talk in ADiMMO Workshop in München, March 30th through 31st.
- Participation at the Sommer School *Shape in Computer Vision and Graphics* in Zürich, September 6th through 8th.
- Participation at the Block-Course *Geometric Algorithms for the Analysis of Shapes and Patterns*, organised by Helmut Alt and Günter Rote April 03rd through 14th. Writing parts and organizing the revision of the script of the above Block-Course.

Frank Hoffmann

- Course *Mathematische Methoden der Informatik II (Mathematical methods of computer science, II)* in the summer semester 2000, Berufsakademie Berlin.
- Referee for *The Computer Journal.*
- Referee for *Computational Geometry: Theory and Applications*
- Referee for *ICALP 2000.*
- Referee for *ISAAC 2000.*
- Member of the committee for Bioinformatics at the Free University of Berlin.
- Member of the search committee for a professorate in bioinformatics.

Astrid Kaffanke

- Lecture *Computational Geometry* at the Informatica Feminale, University Bremen, September 4th through 15th.

- Participant of the block course *Geometric Algorithms for the Analysis of Shapes and Patterns*, April 3rd through 14th.
- Participant of the Summer Course *Triangulations of Polyhedra and Point Sets*, Santander, July 3rd through 7th.
- Participant of the course *Bioinformatics* at the Informatica Feminale, University Bremen, September 4th through 15th.
- Participant at the Fall school on bioinformatics in Neuseddin, organized by Günter Rote.
- Member of the *Frauenrat of the faculty of Mathematics and Informatics*, Freie Universität Berlin.
- Writing a script to the lecture *String Matching Algorithms* (together with Stefan Hell).
- Organizing the stay in Köthen with the Seminar-group *Discrete Optimization*, July 14th through 16th.
- Referee for *ICALP 2000*.
- Referee for *STACS 2001*.

Christian Knauer

- Referee for *STACS 2001*.
- Referee for *ICALP 2000*.
- Referee for *ISAAC 2000*.

Klaus Kriegel

- Referee for *ICALP 2000*.
- Referee for *STACS 2001*.
- Referee for *Journal of Graph Algorithms an Applications*.
- Substitute Professor of BTH Cottbus, winter semester 00/01.

Ulrich Kortenkamp

- Research stay at the CECM (Centre for Experimental and Computational Mathematics), Vancouver, Canada (1 week in June).
- Referee for *ICALP 2000*.
- Referee for *ISSAC 2000*.
- Referee for *STACS 2001*.
- European Academic Software Award 2000 for *Cinderella*
- Nomination for the digita 2001 (Deutscher Bildungssoftwarepreis) for *Cinderella*.
- Gigamaus-Award (1. rank in the category Educational software for ages 13 and older) for *Cinderella*.
- Best rating in the Lernsoftware-Ratgeber 2001 for *Cinderella*.

Lutz Meissner
- Referee for *STACS 2001.*

Nicole Morawe
- Referee for *ICALP 2000.*
- Referee for *STACS 2001.*

Günter Rote
- Referee for *Electronic J. Combinatorics.*
- Referee for *Information Processing Letters.*
- Referee for *INFORMS Journal on Computing.*
- Referee for *J. Algorithms.*
- Referee for *Computing.*
- Referee for *Geometry and Topology.*
- Referee for *Computational Geometry Theory and Applications.*
- Referee for the conference *International Conference on Supercomputing ICS2000* in Santa Fe.
- Referee for the conference *Integer Programming and Combinatorial Optimization (IPCO 2001)*, Eindhoven.
- Coreferee for the diploma theses of Dorothea Rochusch, Emanuel Minetti.
- Member of the program committee for the conference ICALP'2000 (27th Annual International Colloquium on Automata, Languages and Programming, Geneva)
- Member of the program committee for the conference STACS'2001, (18th Annual Symposium on Theoretical Aspects of Computer Science, Dresden)
- Member of the selection committee for the position of professor in technical computer science.
- Member of the selection committee for the position of professor in bioinformatics.
- Member of the Ph.D. committee for Thomas Bickel.
- Member of the habilitation commitee for Stephan Brandt.
- Organization of a minisymposium on combinatorial geometry at the Tenth SIAM Conference on Discrete Mathematics, Philadelphia (jointly with Pavel Valtr)
- Project evaluation for NSERC (the Natural Sciences and Engineering Research Council of Canada)
- Coordination of the Erasmus/Socrates student exchange program for the departments of mathematics and computer science.
- Regular participant of the weekly professor-eating event (elephant circle).
- Department delegate for the conference of computer science faculties in German universities (Fakultätentag Informatik).

Carola Wenk
- Referee for *Journal of Discrete Algorithms.*
- Referee for *ISAAC 2000.*
- Referee for *ICALP 2000.*

- Participation in the Summer school on shape in computer vision and graphics at ETH Zürich.
- Participation in the Fall school on bioinformatics in Neuseddin, organized by Günter Rote.
- Organisation of the colloquium on the occasion of the 50th birthday of Prof. Dr. Helmut Alt.
- Preparation of the 17th European Workshop on Computational Geometry to be held from March 26th through 28th 2001 at Freie Universität Berlin.

Appendix:

Talks in the *Noon Seminar* 12.00 a.m.

January 4th: Christian Knauer
Randomized slope selection

January 6th: Carola Wenk
Hausdorff distance and convex programming

January 11th: Stefan Felsner
Convex drawings of planar graphs

January 13th: Peter Brass
There are no Hausdorff-like metrics for fuzzy sets

January 18th: Nicole Morawe
Simple Polygons in the Plane

January 20th: Laura Heinrich–Litan
Exact L_∞ Nearest Neighbor Search in High Dimensions

January 25th: Ulrich Kortenkamp
Oriented Matroids I

January 27th: Helmut Alt
Cake to Australia, Part 2

February 1st: Günter Rote
Christmas balls and Pólya's theory of counting

February 3rd: Marek Lassak
An Efficient On-line Algorithm for q-adic Covering by Segments

February 8th: Frank Hoffmann
Art Galleries Revisited

February 10th: David Cardoze
Efficient Algorithms for Geometric Pattern Matching

February 15th: Julia Flötotto
2D-Structure Drawings of Similar Molecules

February 17th: Klaus Kriegel
Convex Embeddings of Planar Three-Connected Graphs

Februar 22nd: Astrid Kaffanke
Triangulations of the Projective Plane

February 24th: Christian Knauer
Randomized Slope Selection, Part II

February 29th: Stefan Felsner
Dimension of Polytopes

March 2nd: Pavel Valtr
Generalizations of Davenport-Schinzel Sequences, and their Applications

March 7th: Lutz Meissner
Sorting on Parallel Disks

March 9th: Erik Demaine
Matching in Cubic Planar Graphs

March 16th: Alex Below
Finding Minimal Triangulations of 3-Polytopes is Hard

March 21st: Ulrich Kortenkamp
Oriented Matroids II

March 23rd: Marek Lassak
On widths of a convex body and of an inscribed parallelotope

March 28th: Günter Rote
Enumeration of trees and Catalan numbers

April 18th: Klaus Kriegel
An optimal MST algorithm I

April 20th: Klaus Kriegel
An optimal MST algorithm II

April 25th: Dorothea Rochusch
Zufällige Erzeugung von Catalan-Strukturen

April 27th: Ulrich Kortenkamp
Oriented Matroids III

May 2nd: Carola Wenk
Computing the Frechet distance of polygonal curves under translations

May 4th: Stefan Felsner
Matroid nahe Strukturen I

May 9th: Ulrich Kortenkamp
Oriented Matroids IV

May 11th: Otfried Cheong
Kurven mit begrenzter Krümmung durch Punktfolgen

May 16th: Bischoff
Bilddatenspeicherung für Bildsuchmaschinen

May 18th: Stefan Felsner
Matroid nahe Strukturen II

May 23rd: Ulrich Kortenkamp
Oriented Matroids V - Applications of Gale Duality

May 25th: Christian Knauer
Enumerating unit distances in 3-space

May 30th: Frank Hoffmann
Pattern matching in hypertexts

June 6th: Astrid Kaffanke
Nachbarschaftsverhältnisse in outerplanaren Graphen

June 8th: Laura Heinrich–Litan
Approximate congruence in nearly linear time

June 13th: Helmut Alt
Nächste-Nachbar-Suche in hohen Dimensionen

June 15th: Klaus Kriegel
Monotone Folgen in Permutationen

June 20th: Günter Rote
Der Scarf Complex und Voronoi Diagramme für simpliziale Abstandsmaße

June 22nd: Carola Wenk
Der Fréchet-Abstand unter Translationen II

June 27th: Vladimir Boltyanski
On the Illumination Problem

June 29th: Peter Brass
Finden maximal symmetrischer Teilmengen

July 4th: Lutz Meissner
Columnsort

July 6th: Jonathan Farley
Some open problems for posets and polytopes

July 11th: Nicole Morawe
On a Matching Problem in the Plane

July 13th: Christian Knauer
Fast enumeration of pointhyperplane incidences

July 18th: Frank Hoffmann
How to answer lca-queries in constant time

July 20th: Olaf Beyersdorff
Der freie Pseudoraum – Ein Beispiel einer nicht equationalen Theorie

July 25th: Günter Rote
Sibson's Flächenstehlformel und infinitesimale Entfaltung von Polyedern

July 27th: Inti Cabredo
Min-# Approximation x-monotoner Polygone

August 1st: Astrid Kaffanke
Convex edge-to-edge tilings, Teil 1

August 3rd: Astrid Kaffanke
Convex edge-to-edge tilings, Teil 2

August 17th: Peter Brass
Über symmetrische Polyeder

August 22nd: Peter Brass
Gleichlange Diagonalen in einem konvexen Polygon

August 24th: Laura Heinrich–Litan
Exact nearest neighbor search: tradeoffs between storage and query time

September 5th: Klaus Kriegel
Über das Packen von Ferrer Diagrammen

September 7th: Ulrich Kortenkamp
Geometrische Straight-Line Programme

September 12th: Frank Hoffmann
How to use lca queries for pattern matching

September 14th: Emanuel Minetti
Über Punktmengen mit vielen kleinen Abständen

September 21st: Günter Rote
Max - Plusrang und Kommunikationskomplexität

September 26th: Dorothea Rochusch
Zufällige Catalan - Strukturen

September 28th: Stefan Felsner
SANO, das Projekt

October 5th: Stefan Felsner
SANO, das Projekt, Teil II

October 10th: Peter Brass
Eine schnelle Variante zur Hausdorff-approximativen Teilmustererkennung

October 12th: Ulrike von Nathusius
Wann lässt sich ein Patch zu einer eindeutigen Pflasterung fortsetzen?

October 17th: Friedrich Eisenbrand
Gomory-Chvatal Schnittebenen und die elementare Hülle von Polyedern

October 19th: Helmut Alt
String matching and 2–way deterministic push–down automata

October 24th: Steve Wismath
3-Dimensional Orthogonal Graph Drawing

October 26th: Carola Wenk
On largest common point sets

October 31st: Laura Heinrich–Litan
Nearest Neighbor Search Using Monotone Subsequences

November 2nd: Günter Rote
Dissecting a polygon into two congruent polygons

November 7th: Ulrich Kortenkamp
How to draw a conic

Novemer 9th: Stefan Felsner
On Fishburn's inequality

November 14th: Peter Brass
Unit distances in normed spaces

November 16th: Frank Hoffmann
Illuminating the plane in the presence of segment obstacles

November 21st: Christian Knauer
Economize on randomness

November 30th: Astrid Kaffanke
Greedy Triangulations for Convex Polygons

December 5th: Carola Wenk
Fréchet-Matching a little faster

December 7th: Günter Rote
The greatest common devisor of many numbers

December 12th: Helmut Alt
Speeding up the Douglas–Peucker–Algorithm

December 14th: Laura Heinrich–Litan
Approximate Nearest Neighbor Search

December 19th: Csaba Tóth
Guarding triangles and claws