Jefferson Lab Geometry

This book reports recent major advances in automated reasoning in geometry. The authors have developed a method and implemented a computer program which, for the first time, produces short and readable proofs for hundreds of geometry theorems.The book begins with chapters introducing the method at an elementary level, which are accessible to high school students; latter chapters concentrate on the main theme: the algorithms and computer implementation of the method.This book brings researchers in artificial intelligence, computer science and mathematics to a new research frontier of automated geometry reasoning. In addition, it can be used as a supplementary geometry textbook for students, teachers and geometers. By presenting a systematic way of proving geometry theorems, it makes the learning and teaching of geometry easier and may change the way of geometry education.

First published in 1987, the seven chapters that comprise this book review contemporary work on the geometric side of robotics. The first chapter defines the fundamental goal of robotics in very broad terms and outlines a research agenda each of whose items constitutes a substantial area for further research. The second chapter presents recently developed techniques that have begun to address the geometric side of this research agenda and the third reviews several applied geometric ideas central to contemporary work on the problem of motion planning. The use of Voronoi diagrams, a theme opened in these chapters, is explored further later in the book. The fourth chapter develops a theme in computational geometry having obvious significance for the simplification of practical robotics problems — the approximation or decomposition of complex geometric objects into simple ones. The final chapters treat two examples of a class of geometric ‘reconstruction’ problem that have immediate application to computer-aided geometric design systems.

This book is a collection of surveys and exploratory articles about recent developments in the field of computational Euclidean geometry. The topics covered are: a history of Euclidean geometry, Voronoi diagrams, randomized geometric algorithms, computational algebra; triangulations, machine proofs, topological designs, finite-element mesh, computer-aided geometric designs and steiner trees. Each chapter is written by a leading expert in the field and together they provide a clear and authoritative picture of what computational Euclidean geometry is and the direction in which research is going. Contents:Mesh Generation and Optimal Triangulation (M Bern & D Eppstein)Machine Proofs of Geometry Theorems (S-C Chou & M Rathi)Randomized Geometric Algorithms (K L Clarkson)Voronoi Diagrams and Delauney Triangulations (S Fortune)The State of Art on Steiner Ratio Problems (D-Z Du & F Hwang)On the Development of Quantitative Geometry from Pythagoras to Grassmann (W-Y Hsiang)Computational Geometry and Topological Network Design (J M Smith & P Winter)Polar Forms and Triangular B-Spline Surfaces (H-P Seidel) Readership: Computer scientists and mathematicians. keywords:Computational Geometry;Triangulation;Machine Proof;Randomized Geometric Algorithm;Voronoi Diagram;Delaunay Triangulation;B-Spline;Polar Form;Steiner Tree;Analytic Geometry “D-Z Du and F Hwang have put to rest an optimization problem known as the Steiner ratio conjecture. Their solution closes the book on a problem that had frustrated a generation of geometers, but it also writes the first chapter of a new volume. The key to Du and Hwang's successful attack on the conjecture is a new method that has potential for solving a raft of other optimization problems.” SIAM News, USA “… the eight surveys are well organized. Each survey is preceded by a good introductory section with a rich bibliography. Both beginners and experts will benefit from this book.” Mathematical Reviews “The papers are not just summaries; the authors present new material or fresh points of view … I recommend the book to anyone who works in one of the areas surveyed or who is interested in the interaction of Euclidean geometry and computers.” IEEE Parallel & Distributed Technology

This book contains a series of papers on some of the longstanding research problems of geometry, calculus of variations, and their applications. It is suitable for advanced graduate students, teachers, research mathematicians, and other professionals in mathematics.

The Laboratory Rabbit, Guinea Pig, Hamster, and Other Rodents is a single volume, comprehensive book sanctioned by the American College of Laboratory Animal Medicine (ACLAM), covering the rabbit, guinea pig, hamster, gerbil and other rodents often used in research. This well illustrated reference includes basic biology, anatomy, physiology, behavior, infectious and noninfectious diseases, husbandry and breeding, common experimental methods, and use of the species as a research model. With many expert contributors, this will be an extremely valuable publication for biomedical researchers, laboratory animal veternarians and other professionals engaged in laboratory animal science. A new gold standard publication from the American College of Laboratory Animal Medicine series One stop resource for advancements in the humane and responsible care of: rabbit, guinea pig, hamster, gerbil, chinchilla, deer mouse, kangaroo rat, cotton rat, sand rat, and degu Includes up-to-date, common experimental methods Organized by species for easy access during bench research

This book constitutes the refereed proceedings of the 19th IAPR International Conference on Discrete Geometry for Computer Imagery, DGCI 2016, held in Nantes, France, in April 2016. The 32 revised full papers presented together with 2 invited talks were carefully selected from 51 submissions. The papers are organized in topical sections on combinatorial tools; discretization; discrete tomography; discrete and combinatorial topology; shape descriptors; models for discrete geometry; circle drawing; morphological analysis; geometric transforms; and discrete shape representation, recognition and analysis.

Fermi National Accelerator Laboratory (Fermilab) fabricated the torus magnet coils for the 12-GeV Hall B upgrade at Jefferson Lab (JLab). The production consisted of six large superconducting coils for the magnet and two spare coils. The toroidal field coils are approximately 2 m × 4 m × 5 cm thick. Each of these coils consists of two layers, each of which has 117 turns of copper-stabilized superconducting cable, which will be conduction cooled by supercritical helium. Due to the size of the coils and their unique geometry, Fermilab designed and fabricated specialized tooling and, together with JLab, developed unique manufacturing techniques for each stage of the coil construction. Furthermore, this paper describes the tooling and manufacturing techniques required to produce the six production coils and the two spare coils needed by the project.

Design and Manufacture of the Conduction Cooled Torus Coils for the Jefferson Lab 12GeV Upgrade

This book provides a comprehensive introduction to modern global variational theory on fibred spaces. It is based on differentiation and integration theory of differential forms on smooth manifolds, and on the concepts of global analysis and geometry such as jet prolongations of manifolds, mappings, and Lie groups. The book will be invaluable for researchers and PhD students in differential geometry, global analysis, differential equations on manifolds, and mathematical physics, and for the readers who wish to undertake further rigorous study in this broad interdisciplinary field. Featured topics - Analysis on manifolds - Differential forms on jet spaces - Global variational functionals - Euler-Lagrange mapping - Helmholtz form and the inverse problem - Symmetries and the Noether’s theory of conservation laws - Regularity and the Hamilton theory - Variational sequences - Differential invariants and natural variational principles - First book on the geometric foundations of Lagrange structures - New ideas on global variational functionals - Complete proofs of all theorems - Exact treatment of variational principles in field theory, inc. general relativity - Basic structures and tools: global analysis, smooth manifolds, fibred spaces

Computational Geometry is an area that provides solutions to geometric problems which arise in applications including Geographic Information Systems, Robotics and Computer Graphics. This Handbook provides an overview of key concepts and results in Computational Geometry. It may serve as a reference and study guide to the field. Not only the

most advanced methods or solutions are described, but also many alternate ways of looking at problems and how to solve them.

The papers collected in this book represent an exciting contribution to the growing body of experimental and theoretical research into exotic hadrons. The prime focus of the volume is the latest work on pentaquark baryons.The in-depth experimental reports cover both positive and negative evidence for the existence of various combinations of particles, and photo-electro production, hadronic production and high-energy processes are discussed in detail.Important theoretical areas of current interest are considered, including chiral solitons, constituent quarks, the QCD sum rule, lattice QCD, production reactions, and the determination of spin and parity. The volume features the work of two pioneering theorists, H Lipkin and D Diakonov, among the comprehensive coverage of the latest theoretical ideas in the field.The proceedings have been selected for coverage in:• Index to Scientific & Technical Proceedings® (ISTP® / ISI Proceedings)• Index to Scientific & Technical Proceedings (ISTP CDROM version / ISI Proceedings)• CC Proceedings — Engineering & Physical Sciences

An extensive update to a classic text Stochastic geometry and spatial statistics play a fundamental role in many modern branches of physics, materials sciences, engineering, biology and environmental sciences. They offer successful models for the description of random two- and three-dimensional micro and macro structures and statistical methods for their analysis. The previous edition of this book has served as the key reference in its field for over 18 years and is regarded as the best treatment of the subject of stochastic geometry, both as a subject with vital applications to spatial statistics and as a very interesting field of mathematics in its own right. This edition: Presents a wealth of models for spatial patterns and related statistical methods. Provides a great survey of the modern theory of random tessellations, including many new models that became tractable only in the last few years. Includes new sections on random networks and random graphs to review the recent ever growing interest in these areas. Provides an excellent introduction to theory and modelling of point processes, which covers some very latest developments. Illustrate the forefront theory of random sets, with many applications. Adds new results to the discussion of fibre and surface processes. Offers an updated collection of useful stereological methods. Includes 700 new references. Is written in an accessible style enabling non-mathematicians to benefit from this book. Provides a companion website hosting information on recent developments in the field www.wiley.com/go/cskm Stochastic Geometry and its Applications is ideally suited for researchers in physics, materials science, biology and ecological sciences as well as mathematicians and statisticians. It should also serve as a valuable introduction to the subject for students of mathematics and statistics.

This book contains the proceedings of the third international workshop on From Parity Violation to Hadronic Structure and More. The many applications of parity violation are way beyond the scope of what Lee and Yang could have imagined fifty years after their proposal. For the physics topics discussed during this workshop, the application of parity violation has become a standard work horse allowing for the extraction of many physics topics in different experiments.

This book deals with the latest developments in the area of three-quark systems. Emphasis is given to the discussion of new experimental results in the areas of form factors, unpolarized and polarized structure functions, and baryon structure and spectroscopy. Of particular interest are the new theoretical developments in the area of generalized parton distributions and lattice quantum chromodynamics.

The International Conference on Energy and Mechanical Engineering brought together scientists and engineers from energy and engineering sectors to share and compare notes on the latest development in energy science, automation, control and mechanical engineering. This proceedings compiled and selected 156 articles organized into Energy Science and Technology; Mechanical Engineering; Automation and Control Engineering. Amongst them, are the results and development of Government sponsored research projects undertaken both in universities, research institutes, and across industry, reflecting the state-of-art technological know-how of Chinese scientists.

The design of the 12-GeV torus required the construction of six superconducting coils with a unique geometry required for the experimental needs of Jefferson Laboratory Hall B. Each of these coils consists of 234 turns of copper-stabilized superconducting cable conduction cooled by 4.6 K helium gas. The finished coils are each roughly 2 × 4 × 0.05 m and supported in an aluminum coil case. Because of its geometry, new tooling and manufacturing methods had to be developed for each stage of construction. The tooling was designed and developed while producing a practice coil at Fermi National Laboratory. This paper describes the tooling and manufacturing techniques required to produce the six production coils and two spare coils required by the project. Project status and future plans are also presented.

This introduction to computational geometry focuses on algorithms. Motivation is provided from the application areas as all techniques are related to particular applications in robotics, graphics, CAD/CAM, and geographic information systems. Modern insights in computational geometry are used to provide solutions that are both efficient and easy to understand and implement.

The 22nd International Free Electron Laser Conference and 7th FEL User Workshop were held August 13-18, 2000 at Washington Duke Inn and Golf Club in Durham, North Carolina, USA. The conference and the workshop were hosted by Duke University's Free Electron laser (FEL) Laboratory. Following tradition, the FEL prize award was announced at the banquet. The year 2000 FEL prize was awarded to three scientists propelling the limits of high power FELs: Steven Benson, Eisuke Minehara and George Neill. The conference program was comprised of traditional oral sessions on First Lasing, FEL theory, storage ring FELs, linac and high power FELs, long wavelength FELs, SASE FELs, accelerator and FEL physics and technology, and new developments and proposals. Two sessions on accelerator and FEL physics and technology reflected the emphasis on the high quality of accelerators and components for modern FELs. The breadth of the applications was presented in the workshop oral sessions on materials processing, biomedical and surgical applications, physics and chemistry as well as on instrumentation and methods for FEL applications. A special oral session was dedicated to FEL center status reports for users to learn more about the opportunities with FELs. As usual, the oral sessions were supplemented by poster sessions with in-depth discussions and communications. The FEL physicists and FEL users had excellent opportunities to interact throughout the duration of the event, culminating a Joint

Sessions. The year 2000 was very successful being marked by lasing with two SASE and one storage ring short-wavelength FELs, and by the first human surgery with the use of FEL, to mention but a few. The International Program Committee and chairs of the sessions had the challenging and exciting problem of selecting invived and contributed talks for the conferences and the workshop from the influx of abstracts mentioning new results and ideas. The success of the conference was determined by these contributions. Scientists from 15 countries gave 70 talks, presented 176 posters and submitted 146 papers, which are published in the present volume of proceedings.

Normal faults are the primary structures that accommodate extension of the brittle crust. This volume provides an up-to-date overview of current research into the geometry and growth of normal faults. The 23 research papers present the findings of outcrop and subsurface studies of the geometrical evolution of faults from a number of basins worldwide, complemented by analogue and numerical modelling studies of fundamental aspects of fault kinematics. The topics addressed include how fault length changes with displacement, how faults interact with one another, the controls of previous structure on fault evolution and the nature and origin of fault-related folding. This volume will be of interest to those wishing to develop a better understanding of the structural geological aspects of faulting, from postgraduate students to those working in industry.

From the reviews: "This book offers a coherent treatment, at the graduate textbook level, of the field that has come to be known in the last decade or so as computational geometry. ... ... The book is well organized and lucidly written; a timely contribution by two founders of the field. It clearly demonstrates that computational geometry in the plane is now a fairly well-understood branch of computer science and mathematics. It also points the way to the solution of the more challenging problems in dimensions higher than two." #Mathematical Reviews#1 "... This remarkable book is a comprehensive and systematic study on research results obtained especially in the last ten years. The very clear presentation concentrates on basic ideas, fundamental combinatorial structures, and crucial algorithmic techniques. The plenty of results is clever organized following these guidelines and within the framework of some detailed case studies. A large number of figures and examples also aid the understanding of the material. Therefore, it can be highly recommended as an early graduate text but it should prove also to be essential to researchers and professionals in applied fields of computer-aided design, computer graphics, and robotics." #Biometrical Journal#2

We describe the operation and commissioning of the Jefferson Lab UV FEL using a CW SRF ERL driver. Based on the same 135 MeV linear accelerator as the Jefferson Lab 10 kW IR Upgrade FEL, the UV driver ERL uses a bypass geometry to provide transverse phase space control, bunch length compression, and nonlinear aberration compensation necessitating a unique set of commissioning and operational procedures. Additionally, a novel technique to initiate lasing is described. To meet these constraints and accommodate a challenging installation schedule, we adopted a staged commissioning plan with alternating installation and operation periods. This report addresses these issues and presents operational results from on-going beam operations.

This volume contains Part II of the proceedings of the conference on Free Electron Lasers, held in Beijing, August 1997. Part I appears in a special issue of Nuclear Instruments and Methods A. The last 20 years has seen different stages of FEL development. In these proceedings the reader will find descriptions of many new facilities, new experimental results, new applications, new theoretical developments and new simulation results. Attention is also focussed on the recent progress in experimental observations SASE. The contributions are from 150 scientists from 13 countries, ensuring broad, up-to-date research results from a dynamic field.

This volume presents selections from talks given at the AMS Summer Research Institute on Differential Geometry and Control held at the University of Colorado (Boulder). Included articles were refereed according to the highest standards. This collection provides a coherent global perspective on recent developments and important open problems in geometric control theory. Readers will find in this book an excellent source of current challenging research problems and results.

While high-quality books and journals in this field continue to proliferate, none has yet come close to matching the Handbook of Discrete and Computational Geometry, which in its first edition, quickly became the definitive reference work in its field. But with the rapid growth of the discipline and the many advances made over the past seven years, it's time to bring this standard-setting reference up to date. Editors Jacob E. Goodman and Joseph O'Rourke reassembled their stellar panel of contributors, added manymore, and together thoroughly revised their work to make the most important results and methods, both classic and cutting-edge, accessible in one convenient volume. Now over more then 1500 pages, the Handbook of Discrete and Computational Geometry, Second Edition once again provides unparalleled, authoritative coverage of theory, methods, and applications. Highlights of the Second Edition: Thirteen new chapters: Five on applications and others on collision detection, nearest neighbors in high-dimensional spaces, curve and surface reconstruction, embeddings of finite metric spaces, polygonal linkages, the discrepancy method, and geometric graph theory Thorough revisions of all remaining chapters Extended coverage of computational geometry software, now comprising two chapters: one on the LEDA and CGAL libraries, the other on additional software Two indices: An Index of Defined Terms and an Index of Cited Authors Greatly expanded bibliographies

One of the key components for the superconducting RF Energy Recovery Linac, (ERL) under development in the Collider Accelerator Department at Brookhaven National Laboratory, is the Linac cavity and cryomodule. The cavity is a 5 cell accelerating cavity designed to operate at 703.75 MHz, and to accelerate 2 MeV electrons from the photoinjector up to 15-20 MeV, allow them to make a single pass around the ERL loop and then decelerate them back down to 2 MeV prior to sending them to the beam dump. This cavity was designed by Rama Calaga and Ilan Ben-Zvi at BNL and fabricated by Advanced Energy Systems in Medford, NY. The cavity was then delivered to Thomas Jefferson Laboratory in VA for chemical processing, testing and assembly of the hermetic string assembly suitable for shipment back to BNL. Once at BNL it was built into a complete cryomodule, installed in the ERL test facility and commissioned. This paper will review the key components of the cavity and cryomodule and discuss the present status of the cryomodule commissioning. The BNL 5 cell accelerating cavity has been designed for use in our high average current Energy Recovery Linac, a proof of principle machine to demonstrate key components necessary for the future upgrades to RHIC as well as applications for future ampere class high current, high brightness ERL programs. The cavity has been tested at greater than 20 MV/m with a Q0 of 1e1°, meeting the design specifications for use at full energy in the ERL. This paper will review the cavity design and specifications as well as the RF measurements that have been made both in the VTA at Jefferson Lab as well as during the commissioning in the ERL test cave at BNL. Finally the future plan for cavity testing and measurements prior to its use in ERL operations will be reviewed. The general physics parameters for the cavity can be found in table 1, and the reader is referred to Rama Calaga's Thesis for a much more detailed review of the cavity geometry and design. There are several different parameters that make this cavity design very unique. The first is the 17 cm diameter cavity iris and 24 cm diameter beampipe. The geometry, along with the cavity design, results in a cavity with no trapped higher order modes, and a BBU threshold is> 2 amperes. Another feature of the

geometry of this particular cavity is the fact that the lowest mechanical resonance is at H"00 Hz, thus making it much less susceptible to microphonics.
The Oregon Convention Center, Portland, Oregon, was the venue for the 1997 Cryogenic Engineering Conference. The meeting was held jointly with the International Cryogenic Materials Conference. John Barclay, of the University of Victoria, and David Smathers, of Cabot Performance Materials, were conference chairmen. Portland is the home of Northwest Natural Gas, a pioneer in the use of liquid natural gas, and Portland State University, where cryogenic research has long been conducted. The program consisted of 350 CEC papers, considerable more than CEC-95. This was the largest number of papers ever submitted to the CEC. Of these, 263 papers are published here, in Volume 43 of Advances in Cryogenic Engineering. Once again the volume is published in two books. CEC PAPER REVIEW PROCESS Since 1954 Advances in Cryogenic Engineering has been the archival publication of papers presented at the biennial CEC!ICMC conferences. The publication includes invited, unsolicited, and government sponsored research papers in the research areas of cryogenic engineering and applications. All of the papers published must (1) be presented at the conference, (2) pass the peer review process, and (3) report previously unpublished theoretical studies, reviews, or advances in cryogenic engineering.
This volume, published jointly with the Association for Computing Machinery, comprises a collection of research articles celebrating the occasion of Victor Klee's 65th birthday in September 1990. During his long career, Klee has made contributions to a wide variety of areas, such as discrete and computational geometry, convexity, combinatorics, graph theory, functional analysis, mathematical programming and optimization, and theoretical computer science. In addition, Klee made important contributions to mathematics, education, mathematical methods in economics and the decision sciences, applications of discrete mathematics in the biological and social sciences, and the transfer of knowledge from applied mathematics to industry. In honour of Klee's achievements, this volume presents more than 40 papers on topics related to Klee's research. While the majority of the papers are research articles, a number of survey articles are also included. Mirroring the breadth of Klee's mathematical contributions, this book shows how different branches of mathematics interact. It is a fitting tribute to one of the leading figures in discrete mathematics.
This book is a thoroughly revised result, updated to mid-1995, of the NATO Advanced Research Workshop on "Intelligent Learning Environments: the case of geometry", held in Grenoble, France, November 13-16, 1989. The main aim of the workshop was to foster exchanges among researchers who were concerned with the design of intelligent learning environments for geometry. The problem of student modelling was chosen as a central theme of the workshop, insofar as geometry cannot be reduced to procedural knowledge and because the significance of its complexity makes it of interest for intelligent tutoring system (ITS) development. The workshop centred around the following themes: modelling the knowledge domain, modelling student knowledge, design ing "didactic interaction", and learner control. This book contains revised versions of the papers presented at the workshop. All of the chapters that follow have been written by participants at the workshop. Each formed the basis for a scheduled presentation and discussion. Many are suggestive of research directions that will be carried out in the future. There are four main issues running through the papers presented in this book: • knowledge about geometry is not knowledge about the real world, and materialization of geometrical objects implies a reification of geometry which is amplified in the case of its implementation in a computer, since objects can be manipulated directly and relations are the results of actions (Laborde, Schumann). This aspect is well exemplified by research projects focusing on the design of geometric microworlds (Guin, Laborde).
This volume contains the proceedings of the IX International Conference on Hypernuclear and Strange Particle Physics (HYP 2006). This conference series is devoted to the progress of our knowledge about strangeness flavor in hadron and nuclear physics. Besides the traditional topics such as hadron structure, hypernuclear spectroscopy and weak decay of hypernuclei, a particular focus of this conference was on the properties of strange mesons and their binding in nuclear systems.
The Advances in Architectural Geometry (AAG) symposia serve as a unique forum where developments in the design, analysis and fabrication of building geometry are presented. With participation of both academics and professionals, each symposium aims to gather and present practical work and theoretical research that responds to contemporary design challenges and expands the opportunities for architectural form. The fifth edition of the AAG symposia was hosted by the National Centre for Competence in Research Digital Fabrication at ETH Zurich, Switzerland, in September 2016. This book contains the proceedings from the AAG2016 conference and offers detailed insight into current and novel geometrical developments in architecture. The 22 diverse, peer-reviewed papers present cutting-edge innovations in the fields of mathematics, computer graphics, software design, structural engineering, and the design and construction of architecture.
This book is a collection of surveys and exploratory articles about recent developments in the field of computational Euclidean geometry. Topics covered include the history of Euclidean geometry, Voronoi diagrams, randomized geometric algorithms, computational algebra, triangulations, machine proofs, topological designs, finite-element mesh, computer-aided geometric designs and Steiner trees. This second edition contains three new surveys covering geometric constraint solving, computational geometry and the exact computation paradigm. Contents:On the Development of Quantitative Geometry from Phythagoras to Grassmann (W-Y Hsiang)Computational Geometry: A Retrospective (B Chazelle)Mesh Generation and Optimal Triangulation (M Bern & D Eppstein)Machine Proofs of Geometry Theorems (S-C Chou & M Rathi)Randomized Geometric Algorithms (K L Clarkson)The State of Art on Steiner Ratio Problems (D-Z Du & F Hwang)Voronoi Diagrams and Delaunay Triangulations (S Fortune)Geometric Constraint Solving in R2 and R3 (C M Hoffmann & P J Vermeer)Polar Forms and Triangular B-Spline Surfaces (H-P Seidel)Computational Geometry and Topological Network Design (J M Smith & P Winter)The Exact Computation Paradigm (C Yap & T Dubé) Readership: Computer scientists and mathematicians. keywords:Computational Geometry;Triangulation;Machine Proof;Randomized Geometric Algorithm;Voronoi Diagram;Delaunay Triangulation;B-Spline;Polar Form;Steiner Tree;Analytic Geometry;Exact Computation Review on First Edition: “The papers are not just summaries; the authors present new material or fresh points of view … I recommend the book to anyone who works in one of the areas surveyed or who is interested in the interaction of Euclidean geometry and computers.” IEEE Parallel & Distributed Technology
A key technology issue on the path to high-power FEL operation is the demonstration of reliable, high-brightness, photo-cathode injector operation. The physics and engineering conceptual design of a high-current superconducting RF injector has been completed and will be presented. The system, which is an outgrowth of the existing injector on the Jefferson Lab IRFEL[1], consists of an integrated room temperature DC photocathode gun and a 500 MHz superconducting RF accelerator. The device is compact and produces high-brightness beams. After DC acceleration in the gun, emittance compensation techniques are utilized to reduce the rms normalized emittance by over a factor of two to (approximately)2-1/4 mm-mrad at the output of the RF accelerator. The design is based upon the existing geometry of the Jefferson Lab DC gun and will be capable of operation at 100 mA average beam current.
We describe the design of the SRF Energy-Recovering Linac (ERL) providing the CW electron drive beam at the Jefferson Lab UV FEL. Based on the same 135 MeV linear accelerator as and sharing portions of the recirculator with the Jefferson Lab 10 kW IR Upgrade FEL, the UV driver ERL uses a novel bypass geometry to provide transverse phase space control, bunch length compression, and nonlinear aberration compensation (including correction of RF curvature effects) without the use of magnetic chicanes or harmonic RF. Stringent phase space requirements at the wiggler, low beam energy, high beam current, and use of a pre-existing facility and legacy hardware subject the design to numerous constraints. These are imposed not only by the need for both transverse and longitudinal phase space management, but also by the potential impact of collective phenomena (space

charge, wakefields, beam break-up (BBU), and coherent synchrotron radiation (CSR)), and by interactions between the FEL and the accelerator RF system. This report addresses these issues and presents the accelerator design solution that is now in operation.

Jefferson Lab is constructing a 350 kV direct current high voltage photoemission gun employing a compact inverted-geometry insulator. This photogun will produce polarized electron beams at an injector test facility intended for low energy nuclear physics experiments, and to assist the development of new technology for the Continuous Electron Beam Accelerator Facility. A photogun operating at 350kV bias voltage reduces the complexity of the injector design, by eliminating the need for a graded-beta radio frequency "capture" section employed to boost lower voltage beams to relativistic speed. However, reliable photogun operation at 350 kV necessitates solving serious high voltage problems related to breakdown and field emission. This study focuses on developing effective methods to avoid breakdown at the interface between the insulator and the commercial high voltage cable that connects the photogun to the high voltage power supply. Three types of inverted insulators were tested, in combination with two electrode configurations. Our results indicate that tailoring the conductivity of the insulator material, and/or adding a cathode triple-junction screening electrode, effectively serves to increase the hold-off voltage from 300kV to more than 375kV. In conclusion, electrostatic field maps suggest these configurations serve to produce a more uniform potential gradient across the insulator.

"This book provides developers and scholars with an extensive collection of research articles in the expanding field of 3D reconstruction, investigating the concepts, methodologies, applications and recent developments in the field of 3D reconstruction"--

This book offers a gentle introduction to key elements of Geometric Algebra, along with their applications in Physics, Robotics and Molecular Geometry. Major applications covered are the physics of space-time, including Maxwell electromagnetism and the Dirac equation; robotics, including formulations for the forward and inverse kinematics and an overview of the singularity problem for serial robots; and molecular geometry, with 3D-protein structure calculations using NMR data. The book is primarily intended for graduate students and advanced undergraduates in related fields, but can also benefit professionals in search of a pedagogical presentation of these subjects.

The process of breaking up a physical domain into smaller sub-domains, known as meshing, facilitates the numerical solution of partial differential equations used to simulate physical systems. In an updated and expanded Second Edition, this monograph gives a detailed treatment based on the numerical solution of inverted Beltramian and diffusion equations with respect to monitor metrics for generating both structured and unstructured grids in domains and on surfaces.

The Handbook of Photonics for Biomedical Science analyzes achievements, new trends, and perspectives of photonics in its application to biomedicine. With contributions from world-renowned experts in the field, the handbook describes advanced biophotonics methods and techniques intensively developed in recent years. Addressing the latest problems in biomedical optics and biophotonics, the book discusses optical and terahertz spectroscopy and imaging methods for biomedical diagnostics based on the interaction of coherent, polarized, and acoustically modulated radiation with tissues and cells. It covers modalities of nonlinear spectroscopic microscopies, photonic technologies for therapy and surgery, and nanoparticle photonic technologies for cancer treatment and UV radiation protection. The text also elucidates the advanced spectroscopy and imaging of normal and pathological tissues. This comprehensive handbook represents the next step in contemporary biophotonics advances. By collecting recently published information scattered in the literature, the book enables researchers, engineers, and medical doctors to become familiar with major, state-of-the-art results in biophotonics science and technology.