

RECRUITMENT

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Deutsches Elektronen-Synchrotron XFEL Research



DESY is world-wide one of the leading accelerator centres exploring the structure of matter. The main research areas range from elementary particle physics over various applications of synchrotron radiation to the construction and use of X-ray lasers.

Particle accelerators produce high intensive radiation for most diverse innovative applications. By the forthcoming upgrade of the PETRA storage ring into a 3rd generation synchrotron light source and the construction of the free-electron lasers (VUV-FEL and European XFEL Facility) DESY will take up an international top position in research with photons. X-ray free-electron laser beams impose unprecedented demands on beam transport. For the conception, planning and realization of the XFEL beamline(s) we are seeking a

Staff scientist for XFEL Photon-Beamlines BAT Ib depending on qualification

As the responsible staff scientist you will take a leading role in the development of the European XFEL beamline program and the management of the corresponding technical and human resources. In this function you will work together with the project management, the other staff scientists (undulator systems, diagnostics, detectors, etc.) and the support groups (optics, vacuum, etc.).

The successful candidate will hold a PhD in physics or a related field. Further you will have a proven record in the development and/or commissioning of synchrotron radiation beamlines. This involves expert knowledge of modern beamline concepts, hard- and/or soft x-ray optics and other beamline instrumentation aspects (vacuum, data acquisition and control). Please send your application papers by indication the reference number to our personnel department. For further details, please contact Dr. Grübel on +49 40/8998-2484 (gerhard.gruebel@desy.de) or Dr. Tschentscher on +49 40/8998-3904 (thomas.tschentscher@desy.de).

Salary and benefits are commensurate with public service organisations. DESY operates flexible work schemes, such as flexitime or part-time work. DESY is an equal opportunity, affirmative action employer and encourages applications from women. DESY has a Kindergarten on site.

Deutsches Elektronen-Synchrotron DESY

member of the Helmholtz Association

code: 101/2005 • Notkestraße 85 • D-22603 Hamburg • Germany

Phone: +49 40/8998-3392 • www.desy.de

email: personal.abteilung@desy.de

Deadline for applicants: 4th November 2005

Access **JobsWatch**



cerncourier.com



INSTITUT LAUE – LANGEVIN

The Institut Laue-Langevin (ILL), situated in Grenoble, France, is Europe's leading research facility for fundamental research using neutrons. The ILL operates the brightest neutron source in the world, reliably delivering intense neutron beams to 40 unique scientific instruments. The Institute welcomes 1500 visiting scientists per year to carry out world class research in solid state physics, crystallography, soft matter, biology, chemistry, nuclear and fundamental physics. Funded primarily by its three founder members: France, Germany and the United Kingdom, the ILL has also signed scientific collaboration agreements with seven other European countries.

The Science Division currently has vacancies in its **Nuclear and Particle Physics Group** for:

RESEARCH SCIENTISTS (M/F)

The posts represent an excellent opportunity for young postdoctoral scientists to develop expertise, broaden their experience and interact with leading scientists from around the world. Applications from more experienced scientists able to obtain a secondment period from their home organisation will also be considered.

The vacancies exist on the PN1 and PN3 nuclear physics instruments. Experiments on the mass separator Lohengrin (PN1) include - amongst others - gamma-ray and conversion-electron spectroscopy of very neutron-rich nuclei, produced in nuclear fission. On the ultra-high resolution spectrometers GAMS (PN3) ppm-resolution experiments are conducted with applications in nuclear structure research and fundamental physics.

The successful candidates will each be an "instrument co-responsible" on one of the two spectrometers. They must be highly motivated scientists with a PhD in nuclear physics and should have solid knowledge in gamma-ray spectroscopy and nuclear structure research. Interest in instrumentation, computing and development is also essential. In addition to carrying out their own research programme, the successful candidates will be responsible for assisting ILL's visiting scientists with their experiments and will also participate in operating and developing their instrument.

The successful candidates will be offered a fixed-term contract, the duration of which will under no circumstances exceed five (5) years. In addition to a competitive salary, certain benefits (reimbursement of removal expenses, adaptation allowance, etc.) may be offered.

Further information can be obtained by contacting the Nuclear and Particle Physics Group Leader, Dr. H. Börner Tel: +33 (0)4.76.20.73 94; e-mail: borner@ill.fr.

Applications with curriculum vitae, a list of publications and the names of two academic referees should be sent, quoting reference 05/25, no later than 28.10.2005, by e-mail to A. Taffut: taffut@ill.fr, or by letter to:

Dr. H.G. Börner - INSTITUT LAUE-LANGEVIN
B.P. 156 - 38042 GRENOBLE CEDEX 9 - France
www.ill.fr

In line with our policy of Equal Opportunities, we encourage both men and women with relevant qualifications to apply.



FACULTY POSITION IN ACCELERATOR PHYSICS

NATIONAL SUPERCONDUCTING
CYCLOTRON LABORATORY
MICHIGAN STATE UNIVERSITY

The National Superconducting Cyclotron Laboratory at Michigan State University is seeking outstanding candidates to fill a faculty position in accelerator physics.

The successful candidate should provide a significant increase in the scope and depth of the MSU accelerator physics program, play a leadership role in developing future facility upgrade options, and contribute to the accelerator physics graduate education program at MSU.

The NSCL is the premier rare isotope facility in the U.S. for the next decade having recently completed a facility upgrade that increased the intensity of rare isotopes by several orders of magnitude. The Laboratory has the tradition of close interaction between groups providing an ideal mix of cutting-edge technical infrastructure and an intellectually stimulating open academic environment.

The accelerator physics group is comprised of 2 faculty and 9 professional scientific staff. Accelerator physics R&D has strong infrastructure support from experienced design and manufacturing groups. A strong program of R&D in superconducting rf technology has been developed with necessary facilities in place. Theoretical and experimental research on space charge dominated beams is being pursued. A strong program on linac and cyclotron design for basic research and medical applications have been a core activity in the laboratory for many years.

Depending upon the qualifications of the successful applicant, the position can be filled at the assistant, associate, or full professor level. Applicants please send a resume, including a list of publications, and the names and addresses of at least three references directly to **Professor Richard York, Associate Director for Accelerators, National Superconducting Cyclotron Laboratory, Michigan State University, 1 Cyclotron, East Lansing, MI 48824-1321.** MSU is an equal opportunity / affirmative action institution. For more information, see our website at <http://www.nscl.msu.edu>.

We are currently seeking qualified applicants for the following position at the Faculty 08 - Physics, Mathematics and Informatics -, Institute for Nuclear Physics:

University Professor of Experimental Physics

(succession of Prof. Th. Walcher)
(Full Professor, Bes.Gr. W 3 BBesG)

at the earliest, starting summer semester 2006.

Research activities at the Institute for Nuclear Physics are currently focussed on the use of the cw electron accelerator Mainzer Microtron (MAMI) with a final energy of 1,5 GeV. Furthermore, the Institute is involved in other experiments in the field of hadron physics at CERN and the GSI. Applicants must have an outstanding record of accomplishments in the field of experimental nuclear and particle physics. The successful candidate is expected to use MAMI and its facilities on the basis of the present financial and personnel equipment. The candidate is expected to take a leading role in the development of the institute and its fields of research.

Research at MAMI is supported by SFB 443 "Many-body structure of strongly interacting systems" of the DFG. The successful candidate's field of work should thus be closely related to the investigation of strongly interacting systems with electro-weak probes. The successful candidate is expected to participate in the plans of the Institute for Nuclear Physics to intensify its collaboration with the GSI Darmstadt for the application of complementary methods for the investigation of QCD at small momentum transfers.

Applicants are expected to have a Ph.D. in physics, an excellent research record and to have interest in and aptitude for teaching. Lectures are usually given in German. The Johannes Gutenberg-University promotes a concept of intensive tutoring and requests a high rate of presence at the university. Participation in all teaching activities and academic administration duties of the Faculty is expected.

The Johannes Gutenberg-University Mainz aims at increasing the percentage of women in academic positions and strongly encourages women scientists to apply.

The University is an equal opportunity employer and particularly welcomes applications from persons with disabilities.

Qualified candidates are required to submit their applications, including curriculum vitae, list of publications, list of teaching experience, and reprints of up to five of their most important publications to the



Johannes Gutenberg-Universität Mainz,
Dekan des Fachbereichs 08
- Physik, Mathematik und Informatik -,
D-55099 Mainz, Germany,
not later than October 31, 2005.



THE UNIVERSITY of LIVERPOOL

Department of Physics Lecturer in Physics

£30,607 - £38,778 pa (under review)

We are seeking an outstanding physicist with research interest in Experimental Particle Physics, to lead part of a vibrant research programme (<http://hep.ph.liv.ac.uk/>) at the energy and symmetry frontiers. Current experiments include ATLAS and LHCb at CERN, H1 at DESY, BABAR at SLAC, CDF at Fermilab, and T2K at the Japanese Proton Accelerator Research Complex and Superkamiokande detector. Detector R&D is also underway for ATLAS and LHCb and for e^+e^- physics at an International Linear Collider. Accelerator R&D is a growing feature of the group's activities. The successful candidate will contribute in an innovative way to teaching in the Department.

Informal enquiries to Professor John Dainton on +44 (0)151 794 7769, fax: +44 (0)151 794 3444, email: jbd@hep.ph.liv.ac.uk

Quote Ref: B/564/CC

Closing Date: 31 October 2005

Further particulars and details of the application procedure should be requested from the Director of Personnel, The University of Liverpool, Liverpool L69 3BX on 0151 794 2210 (24 hr answerphone), via email: jobs@liv.ac.uk or are available online at <http://www.liv.ac.uk/university/jobs.html>

COMMITTED TO EQUAL OPPORTUNITIES

2006 Chamberlain Fellowship E.O. Lawrence Berkeley National Laboratory

The Berkeley Lab Physics Division invites outstanding recent PhD recipients to enter the competition for the 2006 **Owen Chamberlain Fellowship** in experimental elementary particle physics and cosmology. Students who expect to receive their PhD degree by the spring of 2006 are also invited to apply.

A Chamberlain Fellow is appointed for three years, with two years of extension possible upon review. Upon appointment, a Chamberlain Fellow is given time to review the Division's research program and may choose to participate in any aspect of it. With the Division Director's approval, he/she may also pursue new initiatives within experimental particle physics or cosmology. In addition to his/her salary, a Chamberlain Fellow receives a \$5,000.00 annual research supplement. Funding for new initiatives is available through a competitive Laboratory-wide program.

Opportunities for collaboration in exciting and diverse physics programs are found both at Berkeley Lab and on the UC Berkeley campus, including research mentorship of physics PhD students. Close interactions with local astrophysics communities are possible, as are relationships with nuclear and accelerator scientists, and access to world-leading computation. For information on the Berkeley Lab Physics Division's research program, please consult <http://www.physics.lbl.gov>.

This Fellowship honors Berkeley Nobelist Owen Chamberlain, who (with Emilio Segre, Clyde Wiegand, and Thomas Ypsilantis) discovered the antiproton at the Berkeley Bevatron in 1955.

Applications will be considered starting **October 10, 2005**, and should include a curriculum vitae, publication list and statement of research interests. Candidates should have at least three letters of reference sent. Please email all materials to Chamberlain.Fellow@lbl.gov and apply on line at <http://jobs.lbl.gov> by October 28, 2005. Please reference **Job #018295**.

LBNL is an equal opportunity employer committed to developing a diverse workforce.



To celebrate the first anniversary of the Computing Section in **CERN Courier**, we're offering a 10% discount for advertisers booking prior to 4 October.

The issue will also be distributed at the **Supercomputing Conference, Washington, 12–18 November 2005.**

For information about how you can **promote your recruitment positions** in the November issue, contact:

Yasmin Agilah

Tel: +44 (0)117 930 1196

E-mail: yasmin.agilah@iop.org

Booking deadline:

7 October

Copy deadline:

10 October

GSII Darmstadt

one of the leading laboratories in heavy ion and hadron physics, member of the Helmholtz Association, and the

JOHANNES
GUTENBERG
UNIVERSITÄT
MAINZ

Johannes Gutenberg-Universität Mainz

invite applications for the joint position of

Leading Scientist and Full Professor (W3)

We are seeking an outstanding individual in the area of experimental hadron physics (non-perturbative QCD) who will also represent this area in teaching at the University Mainz. GSI Darmstadt and the University Mainz provide a broad spectrum of activities in hadron physics with hadronic and electromagnetic probes in particular in the framework of the FAIR Project and MAMI-C.

He/she will lead a research division at GSI and is expected to participate in the scientific program of GSI in close collaborations with the University Mainz and other German and foreign research institutions.

After the appointment to Professor at the University the successful candidate will be granted a leave of absence to GSI (Agreement between Rheinland-Pfalz, the Johannes Gutenberg-Universität Mainz and GSI of 02.02.1983).

GSI and the University are equal opportunity, affirmative action employers and encourage applications from women.

Applications including the curriculum vitae, the list of publications, and research experience and teaching records should be sent in duplicate until October 31, 2005 to

Wissenschaftliche Geschäftsführung der
Gesellschaft für Schwerionenforschung mbH
Planckstraße 1
64291 Darmstadt
GERMANY



www.careers.ualberta.ca

Faculty Positions in Experimental and Theoretical Particle Physics

The Department of Physics at the University of Alberta (www.phys.ualberta.ca) invites applications for two faculty positions in subatomic physics. One of the successful candidates will be nominated for a Canada Research Chair (www.chairs.gc.ca) at either the Tier I (senior) or Tier II (junior) level, depending on experience. The other successful candidate will be offered a tenure track appointment at the Assistant or Associate Professor level.

We are particularly interested in candidates involved in experimental or theoretical particle physics. However, we encourage outstanding scientists in all areas of subatomic physics to apply. Applicants must have established an excellent research track record and be committed to teaching at the undergraduate and graduate levels. The successful candidates will be expected to build strong research programs, supervise graduate students and teach both undergraduate and graduate courses.

The Department has about thirty-six faculty members with research interests in subatomic physics, astrophysics, condensed matter physics, geophysics and medical physics. Our subatomic group includes members with interests in collider physics, particle and nuclear astrophysics, and the standard model. We have excellent electronics, machine shop and computational facilities.

Initiatives by the Governments of Alberta and Canada provide exceptional opportunities for additional funding to establish new research programs at the University of Alberta.

See, for example, www.gov.ab.ca/sra, www.icore.ca, www.gov.ab.ca/is/ahfser and www.innovation.ca for further information.

The application should include a curriculum vitae, a research plan and a description of teaching experience and interests. The applicant must also arrange for at least three confidential letters of reference to be sent to the address below. Consideration of applications will begin on December 1, 2005, but applications will continue to be accepted until the positions are filled. The start date for these positions is July 1, 2006. Applications and reference letters should be sent to:

Particle Physics Search and Selection Committee

Dr. John Beamish

Chair

Department of Physics

University of Alberta

Edmonton, Alberta, Canada T6G 2J1

Fax: (780) 492-0714

Email: dept@phys.ualberta.ca

Deadline: December 15, 2005

All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. If suitable Canadian citizens and permanent residents cannot be found, other individuals will be considered. The University of Alberta hires on the basis of merit. We are committed to the principle of equity in employment. We welcome diversity and encourage applications from all qualified women and men, including persons with disabilities, members of visible minorities, and Aboriginal persons.

Deutsches Elektronen-Synchrotron HERMES-Experiment



DESY is world-wide one of the leading accelerator centres exploring the structure of matter. The main research areas range from elementary particle physics over various applications of synchrotron radiation to the construction and use of X-ray lasers.

The international HERMES collaboration investigates the structure of hadrons and nuclei, with special emphasis to spin, at the HERA collider of DESY in Hamburg. A position is open for a

Postdoc

Your tasks will range from the commissioning of the new recoil detector to the analysis of the first physics data. You have a Ph.D. degree in physics and experience in experimental particle physics. Further information concerning the position is given by Dr. W.-D. Nowak (Wolf-Dieter.Nowak@desy.de). Please send your curriculum vitae, certificates and a list of publications to our personnel department in Zeuthen and arrange sending three letters of reference.

The position is limited for two years with a possible one year extension.

Salary and benefits are commensurate with public service organisations. DESY operates flexible work schemes, such as flexitime or part-time work. DESY is an equal opportunity employer.

Deutsches Elektronen-Synchrotron DESY

member of the Helmholtz Association

code: 88/2005 · Platanenallee 6 · D-15738 Zeuthen · Germany

Phone +49-33762/7-7240 · www-zeuthen.desy.de

email: personal.abteilung-zeuthen@desy.de

Deadline for applicants: 30.11.2005

Head, Fermilab Technical Division

Fermilab seeks an exceptional individual to serve as Head of its Technical Division (TD). Located on a 6800 acre campus 40 miles west of Chicago, Illinois, Fermi National Accelerator Laboratory currently operates the world's highest energy particle accelerator for research into the fundamental properties of matter and is the leading US high energy physics laboratory. Fermilab is operated by the Universities Research Association for the US Department of Energy.

The TD holds responsibility for the development and fabrication of accelerator components in support of the current operating program, and research and development in the technologies that will support future forefront accelerator facilities. Current major R&D activities include growing programs in the development of superconducting RF technologies for the International Linear Collider and Proton Driver, and superconducting magnet development in support of LHC upgrades. The TD is supported with an annual budget of approximately \$30,000,000 and employs approximately 220 people.

The TD Head provides leadership and management of the division in execution of its responsibilities including the establishment and achievement of technical, budgetary, schedule, staff development, and ES&H goals. In addition the TD Head plays a leadership role within Fermilab in charting the operating program and future directions for the laboratory.

The successful candidate for this position will have demonstrated leadership, management, communications, and technical abilities. A strong background in accelerator technologies or related fields, including a PhD or equivalent experience, is required. Prior experience with superconducting RF systems is desirable.

Interested parties requiring more information, or applicants for this position, should contact:

Steve Holmes, Associate Director for Accelerators
Fermilab, MS105
P.O. Box 500
Batavia, IL 60510, USA
holmes@fnal.gov
630-840-3211

Applications should include a curriculum vitae, publication list, and the names of three references.

Fermilab is an Equal Opportunity Employer - M/F/D/V



The National Institute for Subatomic Physics in the Netherlands (NIKHEF) has several openings for

PhD students and postdocs in astroparticle physics

NIKHEF coordinates and supports major research activities in experimental and theoretical subatomic physics in the Netherlands. The institute is involved in large-scale experiments at CERN, DESY, Fermi-Lab, and SLAC.

Applications are invited for postdoctoral research associates and graduate students in the astroparticle physics research group. This group is involved in the development, construction and exploitation of deep-sea neutrino detectors in the Mediterranean Sea. More in particular, the group participates in the ANTARES and KM3NeT collaborations. Within these collaborations NIKHEF is leading the information technology developments, including read-out systems based on modern optical data transmission techniques and advanced filtering and reconstruction software.

Successful applicants will participate in the commissioning of the ANTARES experiment, the analysis of the first data and/or the design and development of the future KM3NeT project.

Further information can be obtained from the web (www.nikhef.nl), or the NIKHEF programme leader, prof. dr. G. van der Steenhoven (phone +31 20 592 2145, email: gerard@nikhef.nl). Applications should be sent to NIKHEF, att. Mr. T. van Egdom, PO Box 41882, NL-1009 DB Amsterdam, the Netherlands, or by email to pz@nikhef.nl.



Faculty Position in High Energy Theoretical Physics

The Department of Physics at the University of California at Davis invites applications for a faculty position in theoretical high energy physics. Appointment at any level is possible depending upon qualifications and experience. The appointment will be directed towards the pursuit of the exciting new ideas and challenges associated with the interface between formal theory and phenomenology. Priority will be given to candidates with recognized leadership in this area and the ability to help implement and lead the High Energy Frontier Theory Initiative (HEFTI). The successful candidate should also have a strong interest in interpreting new phenomena as the relevant experimental data become available from the Tevatron and, especially, the LHC. Interaction and overlap with the particle cosmology group is anticipated. A formal High Energy Frontier Theory Institute is being planned.

The existing high energy group consists of six theoretical and eight experimental faculty. The theorists have a broad spectrum of interests including supercollider physics and phenomenology, supersymmetric modeling and superstring phenomenology, Higgs physics, brane models, lattice QCD, weak-interaction and heavy quark physics, solvable models, and quantum gravity. The experimentalists have major efforts at Fermilab and are active members of the LHC CMS collaboration.

The successful candidate will have a Ph.D. in physics or the equivalent and be expected to teach at the undergraduate and graduate levels.

This position is open until filled; but to assure first round consideration, applications should be received no later than December 5, 2005. The targeted starting date for appointment is July 1, 2006. To initiate the application process, please mail your curriculum vitae, publication list, research statement, and the names (including address, e-mail, fax, and phone number) of three or more references to:

High Energy Theory Search Committee
Department of Physics
University of California, Davis
One Shields Avenue
Davis, CA 95616-8677

Further information about the department may be found on our website at
<http://www.physics.ucdavis.edu>.

The University of California is an affirmative action/equal opportunity employer.



MICHIGAN STATE UNIVERSITY

Tenure Stream Faculty Position Experimental High Energy Physics Michigan State University

The Department of Physics and Astronomy at Michigan State University invites applicants for a tenure stream assistant professor position in experimental high energy physics. We expect to fill the position at the assistant professor level although a more senior appointment may be considered for exceptional individuals. Candidates should have post-doctoral experience, a clear record of research achievement and a strong interest in teaching. The successful applicant will be expected to participate in preparations for physics analysis involving the ATLAS detector at the Large Hadron Collider now being constructed at CERN. Applicants should submit a resume, including a one-page statement of research interests, a list of publications, and have three letters of reference sent to **Prof. Maris Abolins, Search Committee Chair, Department of Physics and Astronomy, 4208 Biomedical Physical Sciences Building, Michigan State University, East Lansing, MI 48824-2320 (hepfacsearch@pa.msu.edu)**. Review of applicants will begin after November 15, 2005 and continue until the position is filled.

MSU is an Affirmative Action/Equal Opportunity Institution.



Kavli Institute
For Cosmological Physics
At The University of Chicago

KICP Postdoctoral Research Fellow at the Rank of Research Associate

The KICP invites applications for one or more NSF Funded Postdoctoral Research Fellows (at the rank of Research Associate) from young scientists of exceptional ability and promise who will have received a PhD. in Physics, Astrophysics or related fields by September 2006. The appointee(s) will be expected to conduct original research in experimental, numerical or theoretical cosmology in an interdisciplinary environment. The initial appointment is for one year, renewal annually, for up to three years. Our positions at the rank of Research Associate have competitive salaries and carry faculty-level benefits. Institute Fellows have the freedom to work on any of the efforts in our Institute.

Research at the Kavli Institute for Cosmological Physics (KICP), based at the University of Chicago, is focused on interdisciplinary topics in cosmological physics: characterizing the Dark Energy, studying the inflationary era, and understanding the highest energy gamma and cosmic rays. Experimental studies of the CMB (polarization anisotropy and the Sunyaev-Zel'dovich effect) and Cosmic Infrared Background; analysis of cosmological data including CMB data and large-scale structure survey data; analysis of Sloan Digital Sky Survey data; high energy astrophysics with photons and cosmic rays; direct detection of Dark Matter particles and numerous topics in theoretical cosmology constitute the current slate of activities. The KICP is seeking to expand the fellowship program to include researchers working on innovative data analysis techniques for large-scale structure, CMB, and other cosmological data. The KICP also has active visitors, symposia, and education/outreach programs. Information about the KICP can be found at <http://kicp.uchicago.edu/>.

An application consisting of a Curriculum Vitae, a statement of research interests, and at least three letters of recommendation should be sent to centerfellow@kicp.uchicago.edu or to **Stephan Meyer, Director, Kavli Institute for Cosmological Physics, 5640 S. Ellis Avenue, Chicago, IL 60637**.

Review of applications will begin on November 15, 2005 for positions that will begin in the Summer or Fall of 2006. The position will remain open until filled.

The University of Chicago is an Affirmative Action/Equal Opportunity Employer.



Postdoctoral Research Fellow

The TWIST Group at TRIUMF has an immediate opening for a Postdoctoral Research Fellow. Information on the TRIUMF Weak Interaction Symmetry Test can be found at <http://twist.triumf.ca>

The successful candidate will be expected to provide leadership and expertise in different aspects of TWIST, such as verification of simulations using the GEANT package, track reconstruction, analysis, detailed studies of systematics, and operation of the detector. A PhD in nuclear or particle physics, or the equivalent, is required. Preference will be given to those applicants within five years of their degree.

The initial term of the appointment will be one year, renewable upon mutual consent, and subject to continued project funding. For full details on this exciting research opportunity, and for application procedures, please visit TRIUMF'S Employment Opportunities, and click on Competition No. 975 <http://www.triumf.info/>

TRIUMF is an equal opportunity employer, and advises that in the event where two final applicants are equally qualified, preference will be given, if applicable, to the Canadian citizen or permanent resident.



The Paul Scherrer Institut is a centre for multi-disciplinary research and one of the world's leading user laboratories. With its 1200 employees it belongs as an autonomous institution to the Swiss ETH domain and concentrates its activities on solid-state research and material sciences, elementary particle and astrophysics, energy and environmental research as well as on biology and medicine.

For our **Department Large Research Facilities (GFA)** we are looking for a

Head of the Laboratory

Accelerator Facilities and Systems

Your tasks

As Head of the Laboratory for Accelerator Facilities and Systems with its approximately 50 staff members you will have the responsibility for operating, maintaining and developing the high intensity proton accelerator complex for research and the superconducting medical cyclotron for proton therapy. You will lead the intensity upgrade program of the proton accelerator complex and perform fundamental research in accelerator physics.

Your profile

You are experimental physicist with excellent knowledge of the physical aspects of accelerators with an outstanding record in this field. Proven leadership and the ability to motivate people are essential requirements.

We are looking forward to your application by October 31, 2005.

Applications including a curriculum vitae and publication list as well as the names and addresses (including email) of at least three references should be sent to: Paul Scherrer Institut, Human Resources, Mr. Thomas Erb, ref. code 8500, 5232 Villigen PSI, Switzerland.

For further information please contact Prof. Dr. Albin F. Wrulich, Tel. + 41 (0)56 310 31 28, E-Mail: albin.wrulich@psi.ch.

Further job opportunities: www.psi.ch



University of California at Berkeley Physics Faculty Positions

Pending budgetary approval, the Physics Department of the University of California, Berkeley intends to make three faculty appointments effective July 1, 2006. One position is targeted for Biophysics. One is targeted for Experimental Particle Physics. Candidates from all fields of Physics are invited to apply for the third position. Appointments at both tenure-track assistant professor and tenured levels will be considered.

Applications must be postmarked by **Wednesday, November 23, 2005**. In addition, please arrange to have one letter of recommendation sent in by this date. UC Berkeley's Statement of Confidentiality can be found at: <http://apo.chance.berkeley.edu/evaltr.html>

E-mail applications will not be accepted. Applications submitted after the deadline will not be considered.

Please send a curriculum vitae, bibliography, statement of research interests, and a list of references to:

Marjorie D. Shapiro, Chair, University of California, Berkeley, Department of Physics,
366 LeConte Hall #7300, Berkeley, CA 94720-7300, Fax: (510) 643-8497

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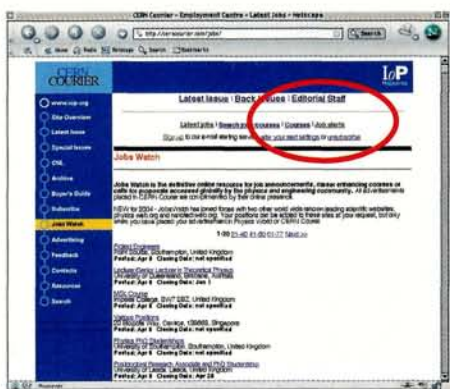
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Image: Prototype display of a simulated event, courtesy of the ALICE collaboration.

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BOOKSHELF

An Introduction to Black Holes, Information and the String Theory Revolution: The Holographic Universe by Leonard Susskind and James Lindesay

World Scientific. Hardback ISBN 9812560831, £17 (\$28). Paperback ISBN 9812561315, £9 (\$14).

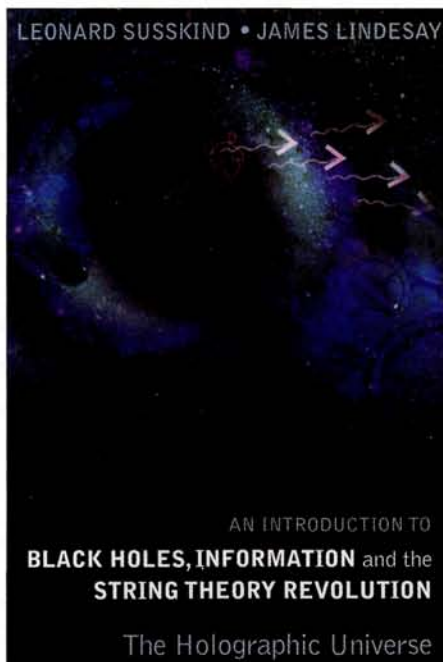
Black holes have attracted the imagination of the public and of professional astronomers for quite some time. The astrophysical phenomena associated with them are truly spectacular. They seem to be ubiquitous in the centre of galaxies, and they are believed to be the power engines behind quasars. There is little doubt of their existence as astronomical objects, but this very existence poses deep and unresolved paradoxes in the context of quantum mechanics when one tries to understand the quantum properties of the gravitational field.

For many readers, the title of this book may sound odd because the contents have little to do with the astrophysical or observational properties of black holes. If you look for nice pictures of galaxy centres and gamma-ray bursts, you will find none. If, however, you are looking for the deep paradoxes in our understanding of quantum-field theory in nontrivial gravitational environments, and the riddles encountered when trying to harness the gravitational force within the quantum framework, then you will find plenty.

At the end of the 19th century, Max Planck was confronted with serious paradoxes and apparent contradictions between statistical thermodynamics and Maxwell's electromagnetic theory. The resolution of the puzzle brought the quantum revolution. When Albert Einstein asked himself what someone would observe when travelling at the same speed as a light beam, the answer revealed a fundamental contradiction between Newtonian mechanics and electromagnetic theory.

The resolution of these problems led to the relativity revolution, first with special and then general relativity. Sometimes experiment itself is not the only way towards progress in our understanding of nature. Conceptual paradoxes often provide the way to a deeper view of the world.

In the 1960s, largely due to Roger Penrose and Steven Hawking, it became understood that under very general conditions, very massive objects would undergo gravitational collapse. The end state



would be a singularity of infinite curvature in space-time shrouded by an event horizon – the last light surface that did not manage to leave the region. The horizon is a profoundly non-local property of a black hole that cannot be detected by local measurements of an unaware, infalling observer.

Classically, black holes were supposed to be black. However, in the early 1970s Jacob Bekenstein and Hawking showed that black holes must necessarily have very unsettling properties. As Bekenstein argued, if the second law of thermodynamics is supposed to hold, then an intrinsic entropy must be assigned to a black hole. Since entropy measures the logarithm of the number of available states for a given equilibrium state, it is logical to ask what these states are and where they came from. The entropy in this case is proportional to the area of the black-hole horizon measured in Planck units (a Planck unit of length is 10^{-33} cm). This is vastly different from the behaviour of ordinary quantum-field theoretic systems.

Meanwhile, Hawking showed that if one considers the presence of a black hole in the context of quantum-field theory, it radiates thermally with a temperature inversely proportional to its mass, so the hole is not black after all. If the radiation is truly thermal, this raises a fundamental paradox, as Hawking realized. Imagine that we generate a gravitational collapse from an initial state

that is a pure state quantum-mechanically. Since thermal radiation cannot encode quantum correlations, once the black hole fully evaporates it carries with it all the subtle correlations contained in a pure quantum state. Hence the very process of evaporation leads to the loss of quantum coherence and unitary time evolution, two basic features of quantum-mechanical laws.

These puzzles were formulated nearly 30 years ago and they still haunt the theory community. It was, nevertheless, realized that resolving these puzzles requires deep changes in our understanding of both quantum mechanics and general relativity, and also a profound modification of the sacrosanct principle of locality in quantum-field theory.

This book is precisely dedicated to explaining what we have learned about these puzzles and their proposed solutions. Assuming that some of the basic features of quantum mechanics (such as unitary evolution) and general relativity (such as the consistency of different observers' observations, no matter how different they may be) do indeed hold, the authors analyse the conceptual changes that are required to accommodate strange phenomena such as black-hole evaporation.

In the process, they masterfully present a whole host of subjects including quantum-field theory in curved spaces; the Unruh effect and states; the Rindler vacua; the black-hole complementarity principle; holography; the Maldacena conjecture and the role of string theory in the whole affair; the notion of information in quantum systems; the no-cloning theorem for quantum states; and the general concept of entropy bounds.

A remarkable feature of this book is that relatively little specialized knowledge is required from the reader; a cursory acquaintance with quantum mechanics and relativity is sufficient. This is impressive, given that the authors cover some of the hottest topics in current research.

The technical demands are low, but conceptually the book is truly challenging. It makes us think about many ideas we take for granted and shakes the foundations of our understanding of basic physics. It provides a rollercoaster ride into the treacherous and largely uncharted land of quantum gravity. This book is highly recommended for those

interested in these fascinating topics.

The authors end with the sentence: "At the time of the writing of this book there are no good ideas about the quantum world behind the horizon. Nor for that matter is there any good idea of how to connect the new paradigm of quantum gravity to cosmology. Hopefully our next book will have more to say about this." We hope so too.

Luis Alvarez-Gaume, CERN.

Quaternions, algèbre de Clifford et physique relativiste par Patrick R Girard, Presses Polytechniques et universitaires romandes. Broché ISBN 288074606X, 68CHF (€45.50).

Ce livre propose une introduction pédagogique à ce nouveau calcul, à partir du groupe des quaternions, avec des applications principalement dans les domaines de la relativité restreinte, de l'électromagnétisme classique et de la relativité générale. C'est le premier ouvrage sur le sujet rédigé en langue française depuis

près de 30 ans. Il s'adresse aux étudiants, professeurs et chercheurs en physique et en sciences de l'ingénieur.

Méthodes quantiques: Champs, N-corps, diffusion par Constantin Piron, Presses Polytechniques et universitaires romandes. Broché ISBN 2880746116, 42CHF (€28).

Cet ouvrage constitue une introduction à la théorie des champs quantiques très différente des exposés habituels le plus souvent formels. Rédigé par l'un des spécialistes francophones en la matière, il est particulièrement clair et didactique, illustré de nombreux exemples et exercices corrigés.

Pulsed Power by Gennady A Mesyats, Springer. Hardback ISBN 0306486539, €227 (£157, \$249).

Meysat provides an in-depth coverage of the generation of pulsed electric power, electron and ion beams, and various types of pulsed electromagnetic radiation, with a wide range of methods for producing up to 10^{14} W of

power for pulse durations from 10^{-10} to 10^{-7} s. The physics of pulsed electrical discharges, properties of coaxial lines, spark gap switches, various plasma and semiconductor switches and their use in pulse generators are covered, as well as the production of high-power pulsed electron and ion beams, X-rays, laser beams and microwaves.

Foundations of Modern Cosmology (Second Edition) by John F Hawley and Katherine A Holcomb, Oxford University Press. Hardback ISBN 9780198530961, £33.99.

The new edition of this thorough, descriptive introduction to the physical basis for modern cosmological theory includes the latest observational results and provides the background material necessary to understand their implications, with a special focus on the concordance model. Emphasis is given to the scientific framework for cosmology, beginning with the historical background and leading to an in-depth discussion of the Big Bang theory and the physics of the early universe.

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