

Faces & Places

APPOINTMENTS

Stan Bentvelsen to be next director of Nikhef

Stan Bentvelsen has been appointed as director of Nikhef – the National Institute for Subatomic Physics, the Netherlands – with effect from 1 December. He will succeed Frank Linde, whose second term as director finishes at the end of the year.

Bentvelsen is currently professor at the University of Amsterdam, where he is director of the Institute for High Energy Physics. He is also a member of the governing board of the Foundation for Fundamental Research on Matter (FOM), a partnership between Radboud University Nijmegen, the University of Amsterdam, Utrecht University and VU University Amsterdam. In the run-up to and during the discovery of a Higgs boson at CERN, he was

Stan Bentvelsen is to take the helm at Nikhef. (Image credit: Jan Willem Steenmeijer.)

responsible for the Dutch contribution to the ATLAS experiment, in his capacity as programme leader.

After studying theoretical physics at the University of Amsterdam, Bentvelsen gained his PhD in experimental physics for research at the HERA collider at DESY. He subsequently worked for six years at CERN on the OPAL experiment, and then joined Nikhef in 2000 as a senior researcher, starting with the preparations for ATLAS. Since 2005, he has been professor of “Collider Physics at the LHC” at the University of Amsterdam.



Bentvelsen will be employed by FOM, but will retain his professorship at the University of Amsterdam. His appointment is for a period of five years, with the possibility of a single reappointment for the same period.

Hafeez Hoorani to head NCP in Pakistan

Hafeez Hoorani has been appointed as director-general of the National Centre for Physics (NCP) in Pakistan. NCP is the focal point of the CERN–Pakistan collaboration, and is currently the only collaborating institute from Pakistan within the CMS collaboration.

Hoorani studied physics at Karachi University before gaining a Masters at Simon Fraser University, Canada, in experimental physics related to the quark–gluon plasma, and later a PhD at the University of Geneva. He first went to CERN in 1989 to work at the Large Electron–Positron collider, later



becoming research director at NCP and professor at Quaid-i-Azam University, Islamabad. He currently works on the forward muon system of CMS, as well as on top–quark physics at CERN. He also served as the scientific director of SESAME for seven years – the light source under construction in Jordan (CERN Courier September 2014 p46).

Hafeez Hoorani, new director-general of the NCP. (Image credit: Muhammad Imran/NCP.)

Since 1994, Hoorani has played a key role in establishing CERN–Pakistan collaboration, which has now led to an important step in the form of Pakistan’s application for associate membership of CERN, which was approved by CERN Council in June.

The National Centre for Physics was set up in 1999, with the distinguished theorist Riazuddin as the first director (CERN Courier March 1999 p5). Its range of studies encompasses not only particle physics but also other fields, from condensed matter to cosmology. NCP collaborates with CERN in the CMS experiment and in the LHC Computing Grid, being the only node for grid in Pakistan.

AWARDS

Theorists honoured in Edinburgh and London

On 28 June, Peter Higgs, of the University of Edinburgh, and François Englert, of Université Libre de Bruxelles, received doctorates in science from one another’s institutions, at a graduation ceremony in the University of Edinburgh’s McEwan Hall. They were honoured for their work on the Brout–Englert–Higgs mechanism, which enables elementary particles to acquire mass. In addition, Higgs was awarded the Freedom of the City of Edinburgh. The particle predicted by the mechanism, known as the

Higgs boson, was discovered in 2012 by the ATLAS and CMS experiments at CERN. In recognition of CERN’s role, the organization’s director-general, Rolf Heuer, also received an honorary degree from the university.

At the same event, Tom Kibble of Imperial College London received a Royal Medal from the Royal Society of Edinburgh – the society’s most prestigious award, granted only with permission of the Queen. Kibble received the award for “his outstanding contribution to the field of theoretical



Left to right: Tom Kibble, Peter Higgs and François Englert, at the ceremony in Edinburgh. (Image credit: Gareth Easton Photography.)

Faces & Places



RF Power?



RF Solutions.



MEGA RF Solutions

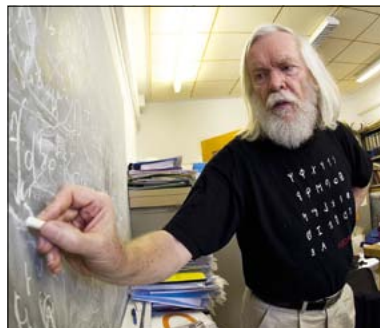
28 Sanford Drive, Gorham, ME 04038 USA
Phone: 207-854-1700 Fax: 207-854-2287

E-Mail: sales@megaind.com www.megaind.com

physics through his research and discovery, with others, of the mechanism that gives mass to elementary particles and which, in so doing, paved the way for unification of the weak and electromagnetic forces". Born in India, he moved to Edinburgh in 1944, where he attended school. He gained his first degrees and then his PhD at the University of Edinburgh. As part of the day's celebrations, the Royal Society of Edinburgh organized a discussion event on "The Future of Particle Physics and CERN", at which Englert, Heuer, Higgs and Kibble all spoke.

In London, the Royal Society has awarded the 2015 Bakerian Lecture to John Ellis, Clerk Maxwell professor of theoretical physics at King's College London, and a leading theorist at CERN until his retirement in 2011. He receives the award "for his ground-breaking contributions in the physics of the Higgs boson and his attempts at unifying the fundamental forces of nature through his work at the LHC".

The Bakerian Lecture is one of the society's premier awards, and is delivered



John Ellis in his office at CERN. (Image credit: CERN-GE-1107174-06.)

annually at the Royal Society in London. The lecture series began in 1775, after the lectureship was established through a bequest by Henry Baker – a typical 18th-century polymath, who made "valuable contributions to the dissemination of scientific knowledge, in particular in the field of microscopy".

CELEBRATION

Golutvin and Onuchin reach their 80th birthdays

Igor Golutvin, one of the leading scientists at JINR, was 80 on 8 August – an event that was celebrated on the day in a special session in Dubna of the 17th Annual RDMS CMS Collaboration Conference. He is well known for several generations of large-scale experiments at JINR, the Institute for High Energy Physics in Protvino and at CERN.

Golutvin began to develop wire spark chambers for neutrino experiments during a first visit to CERN in 1964, when the use of online computers was just beginning. He then used this experience in experiments at the synchrophasotron in Dubna and at the U-70 accelerator at Protvino. Under his leadership, the USSR then had its first – and one of the world's first – online installations to study elastic $\pi\pi$ scattering and $K^0 - \bar{K}^0$ regeneration.

In 1974, he was one of a group of physicists sent to CERN to establish a joint JINR–CERN experimental programme. The successful work by Golutvin and the Dubna team strengthened the participation of the JINR physicists at CERN, and promoted the development of co-operation. NA4, the first joint experiment by the Bologna–CERN–Dubna–Munich–Saclay collaboration, was approved in 1975, and



Igor Golutvin, now 80. (Image credit: Anatoli Zarubin.)

Golutvin led the R&D and construction of the large proportional chambers. The excellent performance and outstanding reliability of these chambers were a key factor in the success of the experiment, which measured structure functions with a precision that has still not been exceeded in the corresponding kinematic region.

At Dubna, Golutvin organized a powerful base for R&D and the mass production of wire detectors of different types and



We have the power!

Heinzinger®
power supplies
supplies your world

YOUR PARTNER IN POWER SUPPLIES FOR ACCELERATOR APPLICATIONS

MAGNET
POWER SUPPLIES

HIGH VOLTAGE
POWER SUPPLIES

HIGH CURRENT
POWER SUPPLIES

HIGH PRECISION
POWER SUPPLIES

FOR RESEARCH, INDUSTRIAL AND MEDICAL ACCELERATORS



Voltages up to 300 000 Volt in Dry Isolation
High Precision Current Regulation by DCCT
For e.g. Dipole, Quadrupole, Steerer Magnets
Current up to 10 000A, Power up to 400kW
High Accuracy, Low Ripple, High Stability

www.heinzinger.com

Heinzinger electronic GmbH | The Power Supply Company
83026 Rosenheim - Germany | Phone +49-8031-2458-0 | info@heinzinger.de



Advertising feature



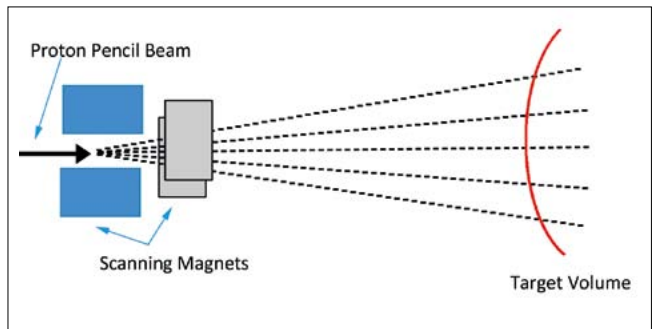
INTEGRATED
ENGINEERING SOFTWARE



Lorentz: 2D/3D Beam Optics and Charged Particle Trajectory

The Lorentz software package solves problems in charged particle trajectory applications.

For example, in cancer treatment, radiation therapy uses photons or charged particles to reduce the size of a tumor. This research requires the design and testing of the beam instrument. This diagram shows an instrument which uses a proton beam to treat complex tumors while leaving healthy tissue undamaged. A pencil sized proton beam travels through a series of scanning magnets which focus the beam onto the target spot.



The Lorentz software has the ability to solve the beam optics of the scanning magnets and provide a beam analysis of the particle trajectories.

www.integratedsoft.com



Goodfellow

www.goodfellow.com

Metals and materials for research

Goodfellow Cambridge Limited

Ermine Business Park

Huntingdon PE29 6WR UK

Tel: 0800 731 4653 or +44 1480 424 800

Fax: 0800 328 7689 or +44 1480 424 900

info@goodfellow.com

ON-LINE CATALOGUE



70 000 PRODUCTS



SMALL QUANTITIES



FAST DELIVERY



CUSTOM MADE ITEMS



FalconX



The World's Most Advanced
X-ray Digital Pulse Processor



> 12% dead-time at 1 Mcps!

sales@xia.com

Tel: +1-510-401-5760

www.xia.com

XIA

Instruments that Advance the Art



Technology Metals | Advanced Ceramics

High Performance Solutions for Particle Accelerators

H.C. Starck's global supply chain produces semi-finished, finished and fully machined parts for particle accelerators. Products include collimator and radiation shielding plus:

- > Beam Blockers
- > Targets
- > Shielding Parts
- > Collimators

Our products are fabricated from Pure Mo, W, Nb, and Ta alloys:

- > Sheet
- > Tube
- > Plate
- > Fabricated Parts
- > Bar

H.C. Starck supplied the tungsten slugs used in the FCAL Section of the Atlas Detector for the Large Hadron Collider (LHC).

info@hcstarck.com
www.hcstarck.com

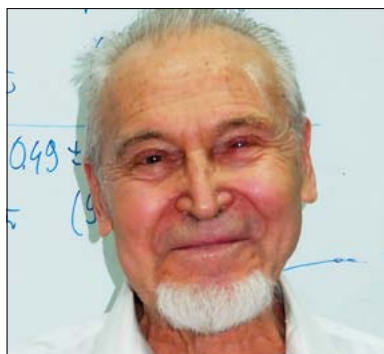
H.C. Starck



their electronics. Drift and proportional chambers constructed under his leadership were used in experiments at Dubna, and large-area chambers manufactured at Dubna were used by the Spin Muon Collaboration at CERN and in the HERA-B experiment at DESY. In 1988, Golutvin initiated a silicon programme at Dubna to develop applications of radiation-hard silicon detectors in experiments at colliders.

For the past 22 years, he has been an organizer of international co-operation in the CMS experiment at the LHC, and has been spokesperson of the Russia and Dubna Member States (RDMS) collaboration in CMS since 1994. The RDMS CMS collaboration, which involves 24 research institutes, was responsible for the design, construction, commissioning and operation of the endcap detectors, including hadron calorimeters and the first forward-muon stations, together with active participation in the design and production of several other sub-detectors. Golutvin continues to pay meticulous attention to development of the RDMS physics programme and computing based on grid technology. He is looking forward to the High Luminosity LHC and actively co-ordinates efforts for further upgrades to CMS calorimetry.

On 3 October, Alexei Onuchin, one of the pioneers of colliding beams, will be 80. His whole scientific career has been spent at the Budker Institute of Nuclear Physics (BINP) in Novosibirsk, where he



Alexei Onuchin, now 80. (Image credit: Valentin Baev.)

has worked since 1959, starting with a PhD thesis devoted to luminosity measurement by small-angle scattering – one of the world's first experiments with colliding beams – and became one of the organizers and active participants of experiments at the VEP-1, VEPP-2 and VEPP-4 colliders.

In 1970, experiments at the e^+e^- collider VEPP-2 in the centre-of-mass energy range 1.18–1.34 GeV discovered multihadronic annihilation simultaneously with the Frascati group. This phenomenon was later to become some of the first evidence for the existence of light quarks. From 1980 to 1985, Onuchi was a leader of the MD-1 experiment at the VEPP-4 collider, which studied the energy range from 7 GeV

to the mass region of the Y mesons. The high-precision measurement of particle masses using resonance depolarization brought him and his colleagues a USSR State Award in 1989. Later he participated in experiments with the KEDR detector at the VEPP-4M collider, and led a Russian group in the BaBar experiment at the SLAC B-meson factory.

Onuchin has contributed a great deal to various experimental techniques of particle detection at BINP – multiwire proportional chambers, the liquid-krypton calorimeter and particularly Cherenkov counters, with which he started working as a student in the laboratory of the Nobel Prize winner Pavel Cherenkov. Onuchin has developed various types of such counters for experiments throughout the world. His work on using aerogel in Cherenkov detectors is well known, and in 2008 he received a Pavel Cherenkov Prize of the Russian Academy of Science for this.

He has always taught and supervised young physicists. His former students include professors, BINP deputy-directors, and a corresponding member of the Russian Academy. Most of the colliding-beam experiments at BINP are led by his students.

A secret of Onuchin's active longevity lies with sport. For many years, fans of cross-country skiing have met him on the skiing track of the Novosibirsk Academy town – and hope to meet him there again next winter.

CONFERENCE

QCD creates strong interactions in Montpellier

The 17th International Conference in Quantum Chromodynamics took place on 30 June–4 July at the Delegation Regionale du Centre Nationale de la Recherche Scientifique (CNRS) in Montpellier. It combined, on one hand, theorists and experimentalists from laboratories around the world and, on the other, young PhD students and postdocs who presented their work for the first time in front of world experts, all working actively within QCD. Its medium size of about 80–100 participants ensures strong interactions at the conference and a family atmosphere where new collaborations often emerge.

This biannual conference, which alternates with the HEPHAD conference series in



Participants at QCD14 in Montpellier. (Image credit: Alizé Photo.)

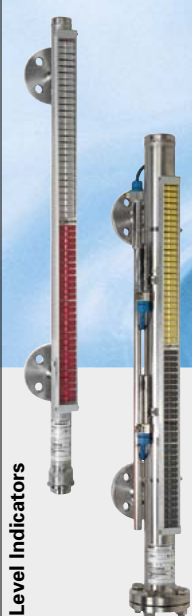
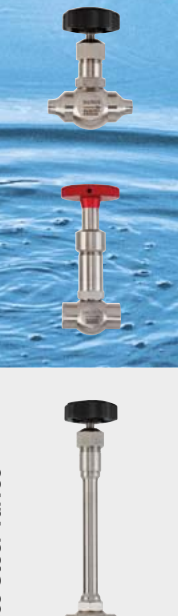
Madagascar, featured LHC physics (on the Higgs boson, top-quark, and W and Z boson production) together with new heavy flavour spectroscopy, light flavours and glueballs, τ -, K- and B-decays, CP-violation, the QCD plasma and some non-perturbative aspects of QCD. Participants discussed several questions, including the new exotic-hadron spectrum. Some talks also tackled the use of perturbation theory at high energy, the inclusion of higher-order corrections and the optimization of QCD perturbative series to evaluate with a better accuracy production

rates at the LHC and other QCD processes, such as the heavy hadron-molecule masses.

The review on the Shifman–Vainshtein–Zakharov sum rules on recent improved results presented by Stephan Narison, the conference organizer, could serve as a useful reference, both for experiments and for theories, in much the same way as lattice computations. Measuring the g-factor of the muon could give a clue to new physics, where the current discrepancy of 3.6σ , between the theoretical estimated value within the Standard Model and the measured one, needs first to be confirmed and then will require improvements of present estimates of the hadronic contributions.

The programme concluded with talks on searches for some new physics beyond the standard model of electroweak interactions.

● For more information about QCD14, visit www.lupm.univ-montp2.fr/users/qcd/qcd14/. Exceptionally, a QCD conference will be held in Montpellier next year (in addition to the regular edition in 2016) on 29 June–3 July, to celebrate its 30th anniversary.

 Visual Level Indicators	 Tank Level Instruments	 Cryogenic Components	 Stainless Steel Valves	 Certified according ISO 9001:2008  Certified according PED 97/23/EC  ZELM Ex Certified according ATEX 94/9/EC  WEKA[®] Member of the ARCA Group WEKA AG · Switzerland Schürlistrasse 8 · CH-8344 Bäretswil Phone +41 43 833 43 43 Fax +41 43 833 43 49 info@weka-ag.ch · www.weka-ag.ch
---	--	--	--	---

ARCA Flow Group worldwide:
Competence in valves, pumps & cryogenics








SAFEDOOR[®]



CUSTOMIZED, CERTIFIED, SPECIAL DOORS



FIRE SAFETY

- ▶ FIRE DOORS
- ▶ FIRE ROLLING SHUTTERS
- ▶ FIRE CURTAINS
- ▶ FIRE GLAZINGS
- ▶ FIRE MANHOLES
- ▶ FIRE BARRIERS



RADIATION SHIELDING

- ▶ RADIATION SHIELDING DOORS
- ▶ HIGH RADIATION SHIELDING DOORS
- ▶ RADIATION SHIELDING WINDOWS
- ▶ HOT CELLS
- ▶ RADIATION SHIELDING WASTE BINS
- ▶ RADIATION & FIRE DOORS

SCHOOLS

Royal Holloway hosts oPAC school

A week-long advanced school on accelerator optimization took place at the Royal Holloway University (RHUL) of London on 7–11 July, attracting around 80 participants from across Europe. Organized as part of the activities of the oPAC network – which focuses on the “optimization of the performance of any particle accelerator” – the school covered accelerator optimization through beam-physics studies, instrumentation R&D and charged-particle beam simulations at an advanced level.

Paul Hogg, the RHUL vice-principal for research and enterprise, and dean of science, opened the school with a welcome address. Lecturers from universities, research centres and industry then presented all aspects of accelerator optimization throughout the week, leading to many interesting

discussions. Highlights included the tutorials held during the week, the lively poster session on Thursday afternoon, the seminar about the discovery of the Higgs boson by Phil Burrows of the University of Oxford, and a lecture about different roads into antimatter by CERN’s Michael Doser.

In addition, the school provided excellent opportunities for networking with colleagues from other institutions, and included a visit to the city of London. Meetings of the oPAC Steering Committee and Supervisory Board also took place during the busy week. Plans were made for future events and all of the R&D projects within the network were discussed.

● oPAC is a network within the Marie Curie Initial Training Network scheme of the European Union’s Seventh Framework



Participants of the oPAC school outside the impressive Founder’s Building at RHUL. (Image credit: oPAC.)

Programme for research, technological development and demonstration, and has received funding under grant agreement no. 289485. For more about oPAC, visit www.opac-project.eu/. For all of the lectures for this school, see <https://indico.cern.ch/event/297045/>.

HASCO 2014 credits its students

The third Hadron Collider Physics Summer School (HASCO 2014) took place on 20 July–1 August in Göttingen, where 83 undergraduate students from 23 institutes in nine countries and 23 lecturers spent the two weeks learning about hadron-collider physics at Femilab’s Tevatron and at the LHC at CERN. The aim of the school is to give the students their first experience of the creative and productive atmosphere associated with working in an international team.

At the HASCO school, the students learn about numerous research topics relevant for hadron-collider physics, including quantum chromodynamics, jet physics, statistical methods in data analysis, accelerator physics, detector physics, physics of the top quark, and searches for supersymmetry or exotic models and particles. In addition, this year’s focus was Higgs boson physics and the transition from the 7/8 TeV run at the LHC to the upcoming 13/14 TeV run. In groups of two from different institutes and countries, the students summarized recent papers from the LHC, the Tevatron or from theory.

All participating students passed the written examination at the end and each of them received six European Credit Transfer System points, which they can invest in their study programmes back at their home



Happy HASCO students. (Image credit: Arnulf Quadt.)

institutions. Many of the students became more interested in studying particle physics, so the hope is to see them in collider-physics research soon.

The 23 partner institutes are Clermont-Ferrand, Grenoble, Orsay, Saclay, Göttingen, Bologna, Milano, Pisa, Roma Sapienza, Amsterdam, Krakow, Bratislava, Barcelona, Madrid, Stockholm, Uppsala, CERN, Bern, Geneva, Glasgow, Manchester, Oxford and Ghent. Ghent, Göttingen and Uppsala are also members of the closely collaborating U4 network. Some of the participating students were summer students from Tokyo, Cambridge, Guincho, Portland and Kathmandu.

● The HASCO school is funded as an ERASMUS intensive programme by the German Academic Exchange Service and the EU under the contract DE-2013-ERA/MOBIP-3-29749-1-16. For further information, visit <http://hasco.uni-goettingen.de>.

Lyn Evans returned to Wales on 17 July to receive an honorary degree from Cardiff University. Born in Aberdare, Evans has spent his whole career in the field of high-energy physics and particle accelerators, and from 1993 led the team at CERN that designed, built and commissioned the LHC. He is currently director of the Linear Collider collaboration, which brings together the Compact Linear Collider Study and the International Linear Collider in a collaboration of more than 2000 scientists. (Image credit: Cardiff University.)



PHOTONIS

INDUSTRY | SCIENCE | MEDICAL

PHOTONIS is the leading manufacturer of high-speed particle and photon detection. Our products support a wide range of physics research applications, and are integrated in many laboratories where high energy, high-speed particle and photon detection is critical.

PHOTON DETECTORS

Fast photon counters and single photon detectors for high-energy physics research applications.

- MCP-PMTs in Round or Square shapes with photocathode choices;
- Hybrid Photo Diodes for single photon counting with extremely low noise.



BEAM PROFILE MONITORING

Fast photonic timing products for beam profile monitoring.

- Image Intensifiers in a wide range of custom photocathodes;
- Streak Tubes for a superior combination of spatial and temporal resolution;
- Electron Generator Arrays for a uniform, dense electron flux;
- Resistive Glass tubes to direct ion flow.



ELECTRON MULTIPLICATION

PHOTONIS is the largest manufacturer of microchannel plates and electron multipliers.

- Microchannel Plates with custom sizes now with a low noise option;
- Channeltron® Electron Multipliers for single channel ion or electron detection.



POWER TUBES

PHOTONIS offers a wide range of power tubes for use in particle accelerators.

- Large Power Triodes and Tetrodes offer full RF amplification for pulsed service.



Call PHOTONIS for all your high-speed, high-energy physics detection needs. We are an established provider to CERN and other research laboratories globally.

PHOTONIS

PHOTONIS France S.A.S.
Avenue Roger Roncier
19100 Brive La Gaillarde
T: +33 (0) 555 86 37 00
E: sales@photonis.com
W: www.photonis.com

Faces & Places

ASTROPARTICLE PHYSICS

CERN hosts Patras Workshop on Axions, WIMPs and WISPs



The Patras Workshop returned to CERN in July for its 10th anniversary, having begun there in 2005. The initial aim was to provide academic training to the new generations of scientists working within

the EU's Integrated Large Infrastructure for Astroparticle Science network, which covered the already mature field of astroparticle physics (*CERN Courier* July/August 2006 p19). Following increasing worldwide interest in the workshop, the organizers widened its agenda, inspired by the possibilities that are opening up in ongoing searches for exotica such as axions, WIMPs, etc. Results from direct and indirect searches for axion-like particles (ALPs), also dubbed weakly interacting slim (light) particles (WISPs), and new, more sensitive searches for electric-dipole moments, were also covered in the latest workshop. Participants from more than 40 institutions around the world had the opportunity to present their latest results and discuss detector-upgrade plans and exciting new ideas for future research. As a result of the high number of participants, the programme also included a poster session for the first time.

Speakers covered diverse new approaches in dark-matter, dark-energy and neutrino physics, including astrophysical observations, as well as novel ideas for detection using state-of-the-art instrumentation. In his opening address, CERN's director-general, Rolf Heuer, emphasized that following the discovery of a Higgs boson, there remain big questions related to the hidden side of the universe. The talks that followed demonstrated the breadth in experimental searches for constituents of dark matter and dark energy, from direct searches for WIMPs in underground experiments with the lowest noise, axion or WISP searches with cavity and "light-shining-through-a-wall" experiments, and not-so-indirect searches in specific solar or cosmic observations with orbiting equipment, to searches at the

LHC. Hidden photons and gauge bosons of various kinds are also being searched for with accelerators and solar observations. Theories span an even greater breadth, as manifest in the mass range of the expected exotica.

The Patras programme traditionally features results, theoretical ideas and exciting projects beyond the main focus of the meeting. This time, participants heard about the latest results from space X-ray missions, the Indian SOXs and the Chinese Chang 'E1. Data from both missions are being re-analysed to search for overlooked signatures of dark-matter or dark-energy constituents in their solar X-ray observations.

Upgrade plans were also presented at the workshop. The performance of experimental techniques – either in use or suggested – to unravel the nature of the enigmatic dark sector is advancing impressively, with a remarkable overlap between LHC physics and astroparticle physics. The state-of-the-art equipment used faces two extreme situations: the LHC experiments have to deal with unprecedented high background rates, while the dark-matter/dark-energy searches with the lowest signal levels require ever increasing background screening. Here, equipment developed for high-energy physics and other disciplines finds an increasing number of applications in astroparticle physics. Micromegas detectors, powerful magnets and high-sensitivity antennae in the sub-electron-volt range, for example, are typical of the interdisciplinary character of many experiments that are being upgraded or are in the conceptual-design phase.

In the spirit of the workshop series, discussions were lively and the atmosphere friendly, although occasionally not without scientific controversy. A number of new ideas were presented, mostly highly interdisciplinary in character, profiting from the strong synergies developed between theory and experiment. By bringing together experts working on so many diverse topics, the workshop continues to contribute to the ongoing scientific revolution in astroparticle physics to uncover the unknown universe.

● For more information, visit <http://axion-wimp2014.desy.de/>.



1st Industrial Meeting SPAIN at CERN

28-29 October 2014

Spanish Industry will meet CERN next 28th and 29th of October as a great opportunity to share knowledge and expertise with particle physics community. The most representative firms of every outstanding technologies will show their capabilities and projects developed at CERN and other large facilities around the world. CERN technicians, Spanish researchers and other relevant experts in the field will hold speeches and conferences in the main building premises during the event. All members are welcome to join the meetings and exhibitions, also to participate and find a reliable partner in Spain.

Schedule and activities will be published soon in our website
<http://spain-at-cern.web.cern.ch/>



Centro para el
Desarrollo
Tecnológico
Industrial

Opening hours:

Tue 28th, 9:00 – 16:00
Wed 29th, 9:00 – 17:30

Location:

CERN main building (500),
Council Chamber
and Amphitheatre

Information:

<http://spain-at-cern.web.cern.ch/>

thermodynamicscompetent
www.reuter-technologie.de



Your Expert for Vacuum Brazing

Ceramic chamber



Waveguide structures



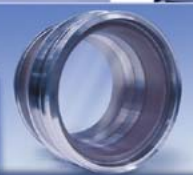
UHV compatible joining of
Ceramic to Stainless Steel



First wall cooling structure



Pumping port



Vacuum brazing of
Diamond to Copper

1

Hydrogen

H

1.0079

0.0001

-252.87

2

Helium

He

4.0026

0.1777

-268.93

3

Lithium

Li

6.941

0.54

180.5

4

Beryllium

Be

9.0122

1.85

1287

11

Sodium

Na

22.990

0.97

97.7

12

Magnesium

Mg

24.305

1.74

650

19

Potassium

K

39.098

0.86

63.4

20

Calcium

Ca

40.078

1.55

842

27

Cobalt

Co

58.933

8.90

1495

28

Nickel

Ni

58.693

8.92

1455

29

Copper

Cu

63.546

8.92

1084.6

30

Zinc

Zn

65.39

7.14

419.5

37

Rubidium

Rb

85.468

4.47

39.3

38

Strontium

Sr

87.62

2.63

777

39

Yttrium

Y

88.906

4.47

1520

40

Zirconium

Zr

91.224

6.51

1655

41

Niobium

Nb

92.906

8.57

2477

42

Molybdenum

Mo

95.96

10.28

2623

43

Technetium

Tc

[98]

11.4

2157

44

Ruthenium

Ru

101.07

10.21

2304

45

Rhodium

Rh

102.91

12.45

1964

46

Palladium

Pd

106.42

12.02

1554.2

47

Silver

Ag

107.87

10.49

961.8

48

Cadmium

Cd

112.41

8.65

321.1

49

Indium

In

114.82

7.31

327.5

50

Tin

Sn

118.71

7.31

231.5

51

Antimony

Sb

121.76

6.70

469.5

52

Tellurium

Te

127.60

6.24

449.5

53

Iodine

I

126.90

4.94

113.7

54

Xenon

Xe

131.29

5.87

-108.05

55

Cesium

Cs

132.91

1.88

28.4

56

Barium

Ba

137.33

3.51

727

57-70

Lanthanoids

* Lanthanoids

** Actinoids

57 Lanthanum La 138.91 6.149 920	58 Cerium Ce 140.12 6.899 795	59 Praseodymium Pr 140.91 6.84 935	60 Neodymium Nd 144.24 6.80 1024	61 Promethium Pm [145] 7.264 1100	62 Samarium Sm 150.36 7.303 1072	63 Europium Eu 151.96 7.901 826	64 Gadolinium Gd 157.25 7.919 1312	65 Terbium Tb 158.93 8.219 1356	66 Dysprosium Dy 162.50 8.551 1407	67 Holmium Ho 164.93 8.799 1461	68 Erbium Er 167.26 9.066 1529	69 Thulium Tm 168.93 9.321 1545	70 Ytterbium Yb 173.04 6.97 1554
89 Actinium Ac [227] [227] [227]	90 Thorium Th 232.04 11.72 1760	91 Protactinium Pa 231.04 15.37 1566	92 Uranium U 238.03 19.05 1132	93 Neptunium Np [237] 20.45 637	94 Plutonium Pu [244] 19.816 659	95 Americium Am [243] 13.78 1176	96 Curium Cm [247] 13.51 1340	97 Berkelium Bk [247] 14.78 986	98 Californium Cf [251] 15.1 960	99 Einsteinium Es [252] 15.1 880	100 Fermium Fm [257] 15.1 1007	101 Mendelevium Md [258] 15.1 827	102 Nobelium No [259] 15.1 827

METALS & ALLOYS for Research / Development & Industry

Tel + 44 1865 884440
Fax + 44 1865 884460
info@advent-rm.com

Small Quantities • Competitive Prices • Fast Shipment

Advent Research Materials Ltd • Oxford • England OX29 4JA

advent-rm.com



ULTRATHIN METAL FOIL 0.1-25µ

Filters
Windows
Targets
Photocathodes
Vacuum Tight
Be Windows

LEBOW COMPANY
FAX/PHONE 805 964-7117
5960 Mandarin Avenue / Goleta, CA 93117



Trek www.trekinc.com

High-Voltage Amplifiers

- Voltage Range to ± 60 kV
- Slew Rates to 1500 V/ μ s
- Current to 10 A
- Bandwidth to 3 MHz

Currently Under Development:

+1 kV @ 10 A, <10 ns rise time High-Voltage Pulser

± 17.5 kV @ 700 mA Amplifier for high-voltage component testing

(t): +1-716-438-7555 • (f): +1-716-201-1804 • sales@trekinc.com
TREK, INC., 190 Walnut Street, Lockport, NY 14094 USA

Faces & Places

VISITS

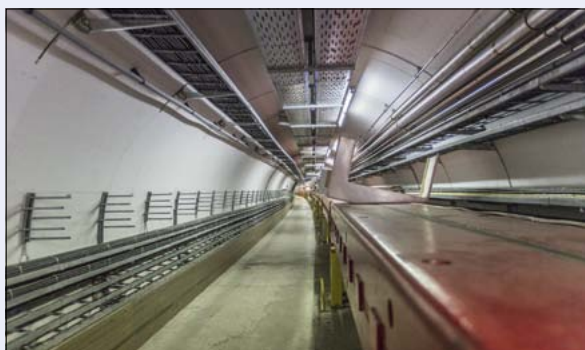


On 16 July, the European Commission Joint Research Centre director-general, **Vladimir Sucha**, left, visited the LHC tunnel accompanied by CERN's director of accelerators and technology, **Frédéric Bordry**, right, and the head of the EU Projects Office at CERN, **Svetlomidir Stavrev**. (Image credit: CERN-PHOTO-201407-148 – 10.)



To mark the opening of the 7th Bulgarian High School Physics Teachers Programme at CERN, the Bulgarian deputy minister of education and science, **Mukkades Nalbant**, left, visited the laboratory on 28 July. Here she is being presented with a temperature-sensitive mug that depicts the history of the universe by CERN's head of international relations, **Rüdiger Voss**. (Image credit: CERN-PHOTO-201407-163 – 11.)

Giesela Kopper, the minister of science, technology and telecommunications of the Republic of Costa Rica, visited CERN on 29 August. After learning about the High School Teachers' programme, she visited the Synchrocyclotron, ATLAS, the superconducting magnet test hall and the CERN Computer Centre, before signing the guestbook, with the director-general, **Rolf Heuer**. (Image credit: CERN-PHOTO-201408-169-9.)



Construction work on the Super Proton Synchrotron (SPS) at CERN began in 1972, soon after an agreement had been signed with France to establish a new site at Prévessin. With its 7 km tunnel, it became the world's first cross-border accelerator. In the black and white image from early 1974, the year of CERN's 20th anniversary, the metal structure of the shuttering used when pouring the concrete walls of the tunnel gives a remarkable optical effect. The accelerator started up two years later on 17 June 1976. The colour image, from last November, shows the red bending magnets of the SPS, almost 40 years later, during the first long shutdown of the accelerator complex. Today, the SPS serves as the final stage of the injection chain to the LHC, and also continues to deliver beam to experiments in the North Area at Prévessin. Like the rest of the complex, it has seen its fair share of refurbishment during the shutdown (p9). (Image credits: CERN-CE-7402048 and CERN-GE-1311288-02.)

MDC Vacuum components

Custom fabrications

MDC is equipped to build custom vacuum components of virtually any complexity. **Vacuum vessels can be built to your exact specifications** from a rough hand-sketch, detailed engineering drawings or anything in-between.

Burst disks

MDC's BDA-Series **ASME UD Certified** Burst Disks are designed as a safety device to protect vacuum systems against over pressurization.

Breaks and envelopes

Breaks and Envelopes in nominal tube sizes ranging from 3 to 200 mm are available on standard catalogue assemblies. Custom break assemblies up to 280 mm in diameter and 1200 mm in length are available upon request. MDC now offer custom break assemblies with **operating temperatures of 900°C** as well as high temperature material alternatives.

For more information please visit our website:
www.mdcvacuum.co.uk

MDC Vacuum Limited
3 Horsted Square
Bellbrook Industrial Estate
Uckfield
East Sussex TN22 1QG
United Kingdom
Tel: +44 (0)1825 280 450
Fax: +44 (0)1825 280 440
sales@mdcvacuum.co.uk



Detection Solutions for Today and Tomorrow

Gamma • Neutron • X-ray

Radiation Detectors for Passive,
Active and Imaging Applications



Discover today the products of tomorrow



THE **SENSOR KIT**

Visit us at IEEE NSS/MIC Nov 10 - 13 – Booth 201&203

Look for these Posters and Talks in the IEEE Technical Program

- Scintillation Performance of Ce Only and Sr Co-Doped $\text{Cs}_2\text{LiYCl}_6$ Crystals up to 180°C
- Next Generation LYSO:Ce,Ca Single Crystals
- Enhanced Alpha-Gamma Discrimination in Co-Doped $\text{LaBr}_3(\text{Ce})$
- Improved 1.5" and Larger CLYC and CLLB Detectors for Dual Gamma and Neutron Detection

www.crystals.saint-gobain.com
E-mail: scintillation@saint-gobain.com
U.S.: +1 440 834 5600
Europe: +31 35 60 29 700


SAINT-GOBAIN

OBITUARIES

Andrew Sessler 1928–2014

Andrew Marienhoff Sessler passed away on 17 April, following a long illness. A former director of Lawrence Berkeley National Laboratory (LBNL), he was a visionary in accelerator and energy sciences, and was instrumental in the worldwide effort to liberate scientists suffering from political oppression.

Born on 11 December 1928, Andy showed an early talent for science, and was one of the first Westinghouse Talent Search finalists. He received a BA in mathematics from Harvard and a PhD in physics from Columbia University. He was in the first group of National Science Foundation postdocs, working at Cornell University with Hans Bethe. From 1954 to 1959 he was on the faculty at Ohio State, after which he joined what is now LBNL. He spent the rest of his career there and served as the third director from 1973 to 1980.

Andy made several key contributions to physics and accelerator science. His paper with J Emery in 1960, together with a contemporaneous competing paper from Anderson *et al.*, is generally acknowledged as the first to predict the superfluid transition of helium-3. His contributions to accelerator science, which began with his association with the Midwestern Universities Research Association, were pivotal for developing modern high-performance accelerators. They included a Hamiltonian-based radio-frequency acceleration theory, developing a method to produce intense circulating proton beams by stacking, which made very-high-luminosity proton colliders feasible, such as CERN's LHC, and a systematic study of beam instabilities at high intensity, which became the standard for all modern accelerator design. His 1981 proposal for a high-gain free-electron-laser (FEL) amplifier for high-power, millimetre-wave generation, helped lay the foundations for the emergence of the era of X-ray FELs that began in 2009 with the successful start of operation of the Linac Coherent Light Source at SLAC. His basic concept for a two-beam accelerator that mixed high and low energies and currents was modified to become the Compact Linear Collider project at CERN, a candidate technology for a future multi-tera-electron-volt electron-positron linear collider.

As director of LBNL, Andy ushered in a new era of research on energy efficiency and sustainable-energy technology by



Andy Sessler. (Image credit: The Regents of the University of California, through the Lawrence Berkeley National Laboratory.)

establishing what would become the Energy and Environment Division, the first such group at any of the US national laboratories. This was instrumental in transforming the mission of the national laboratories from science labs to science, engineering and energy labs. Under Andy's leadership, LBNL grew to its largest size ever, with more than 5000 employees, and expanded beyond its leading roles in physics, chemistry and biology to its current multi-programme efforts.

In addition to his ground-breaking work in particle-accelerator and beam physics, and his leadership in directing the scientific research landscape towards new horizons in sustainable energy and the environment, Andy was also an acclaimed humanitarian and public advocate for scientific freedom. His activities at the American Physical Society (APS) across many years helped transform its focus on "physics" to include "physics and society", with attention to national funding, patterns of employment, science education at all levels, societal issues involving physics, informing the public, international affairs, arms control and, in particular, the human rights of his physics colleagues.

Intensely concerned about human rights, Andy focused on scientists caught in political situations beyond their control. He wrote letters in support of dissidents in the Soviet Union and other countries. He was active on boards and committees that pursued human-rights activities within many organizations, including the APS, the National Academy of Sciences, the New York

Academy of Sciences, the Committee of Concerned Scientists, the Union of Concerned Scientists, and Amnesty International. He donated large sums of money to charities including Doctors without Borders, Berkeley Food and Housing, and FINCA (a global charitable microfinance organization).

He was instrumental in initiating the APS Committee on International Freedom of Scientists and raising funds to endow the APS Sakharov Prize for Human Rights. Along with his colleague Moishe Pripstein, he was a co-founder of Scientists for Sakharov, Orlov, and Sharansky (SOS). Protests by SOS and others led to the release of these Soviet dissidents and to an overall increase in pressure by the scientific community in solidarity with their politically oppressed colleagues. He also was one of the principal organizers of the "good-faith witness" exchange, which earned the release of Elena Bonner, the wife of Andrei Sakharov, from the Soviet Union to the US to receive medical care.

Andy's many honours included the 1970 Ernest Orlando Lawrence Award – the US Department of Energy's highest scientific recognition; the 1995 Dwight Nicholson Medal and the 1997 Robert R Wilson Prize of the APS; and the US government's Enrico Fermi Award in early 2014. He was APS president in 1998.

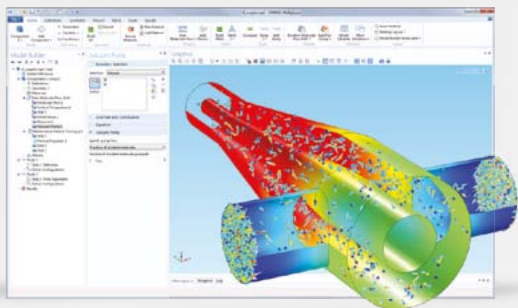
Andy was an avid outdoor person and loved sharing physical activities, such as swimming, rowing, skiing and cycling, with family and friends. He was a mentor to many younger colleagues and to many his own age, who learned much from him. Later in life, he could be found jogging with others during lunchtime, sharing jokes and solving physics challenges. Just as he loved sharing the outdoors, he loved sharing knowledge, and seldom wrote scientific papers alone. A long-time friend and colleague expressed a sentiment shared by many who knew Sessler: "If there was ever a scientist for whom the physics community was at the centre of his life and work, it was Andy Sessler."

He is survived by three children and six grandchildren.

● *Andy Sessler's longtime friends and colleagues Robert Budnitz, Kwang-Je Kim and Herman Winick. Based with permission on the obituary published on the Berkeley Lab News Center website <http://newscenter.lbl.gov/2014/04/18/in-memoriam-andrew-seessler/>.*

VERIFY AND OPTIMIZE YOUR DESIGNS WITH COMSOL MULTIPHYSICS®

RF COUPLER: This model computes the transmission probability through an RF coupler using both the angular coefficient method available in the Free Molecular Flow interface and a Monte Carlo method using the Mathematical Particle Tracing interface.



Multiphysics tools let you build simulations that accurately replicate the important characteristics of your designs. The key is the ability to include all physical effects that exist in the real world.

To learn more about COMSOL Multiphysics, visit www.comsol.com/introvideo

© Copyright 2013-2014 COMSOL



TECNOMEC

PRINTED CIRCUIT BOARDS

MULTILAYERS IN 3-5 DAYS

FAST SPECIAL PRODUCTION SERVICE

HIGH TG AND MICROWAVE MATERIALS

FLEX, RIGID-FLEX, TEFLON, METAL CORE

FINE LINE, MICRODRILLING BLIND AND BURIED

3D HIGH COPPER STRUCTURING FOR POWER APPLICATIONS



TECNOMEC s.r.l.

Via Melaro 11, 36041 Alè di Montebelluna (VI) - Italy
Tel. 0039. 0444 694333 - Fax 0039. 0444 698322
info@pcb-tecnomec.com - www.pcb-tecnomec.com

photodiode preamplifiers

*perfect for
pulse
detection!*

*shaping
amplifiers*



all product specifications can be found online at:

<http://cremat.com>

Cremat's low noise charge sensitive preamplifiers (CSPs) can be used to read out **pulse** signals from **p-i-n photodiodes**, **avalanche photodiodes (APDs)**, **SiPM photodiodes**, semiconductor radiation detectors (e.g. Si, CdTe, CZT), ionization chambers, proportional counters, surface barrier/PIPS detectors and PMTs.

Our CSPs and shaping amplifiers are small epoxy-sealed plug-in modules less than 1 in² in area. We also provide evaluation boards for these modules, letting you easily and quickly integrate these parts into your instrumentation.

cremat

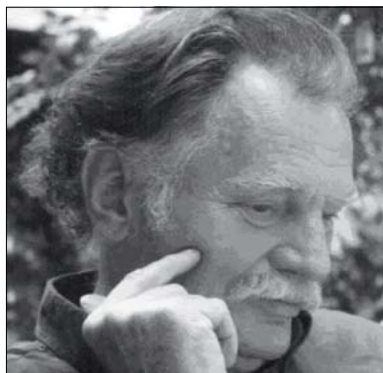
**950 Watertown St
West Newton, MA
02465 USA
+1(617)527-6590
info@cremat.com**

Klaus Dietz 1934–2014

Klaus Dietz passed away on 17 January at the age of 79, after a long struggle with complications following a heart operation. The Physikalisches Institut at the University of Bonn has lost a highly renowned colleague who made his mark beyond theoretical particle physics.

Born in 1934 in Würzburg, Klaus studied physics at the universities of Erlangen, Munich and Karlsruhe, where in 1962 he earned his PhD under Gerhard Höhler, on the role of pion–pion interactions in pion–nucleon scattering. After three years at CERN and the University of Illinois, he took up research positions at the Nuclear Research Centre Jülich and the University of Bonn, where he began teaching in 1967. Two years later he accepted a professorship in Bonn, a position he held for 40 years until his retirement as emeritus in 2009. Besides research and teaching, during this period Klaus co-organized the Johns Hopkins Workshops in the years 1980–1985, and provided advice to the Alexander von Humboldt Foundation for a number of years.

His research until 1968 featured important contributions to the interaction of pions with pions, nucleons and photons, followed by papers on dual-resonance models. However, his central research topic after 1975 became the application of semiclassical field-theoretical methods to relativistic many-body systems, in particular to atoms and the inhomogeneous electron gas. Hardly anyone has more effectively combined the



Klaus Dietz. (Image credit: Hannelore Dietz.)

formal elegance of functional methods with concrete physical problems. After the late 1980s, strong laser fields and periodically driven quantum systems moved into his focus. The breadth of his work is remarkable, ranging from fundamental mathematical physics to the physical chemistry of certain molecules. In his final decade, Klaus became fascinated with open quantum systems, in particular with Lindblad dynamics and multi-qubit states.

Still more remarkable than this broad range of work is his success as a teacher: Hartmann Römer, Werner Nahm, Wilfried Buchmüller, Thomas Filk, Heinz-Peter Breuer, Martin Holthaus and Joachim Henkel, like myself, took their first steps in science under his supervision. Klaus applied a high standard to

his students, as he did to himself. His criticism could be harsh but it was always to the point and never disrespectful. His keen sense of the essential and a disdain for trivialities set an example to follow. His imposing appearance underscored the persuasive power of well-chosen words.

Research was a passion for Klaus. Driven by his quest for beauty and true to his motto “off to pastures new”, he had an avid interest in new scientific ideas. He also had a keen interest in music, fine arts and literature, as well as in foreign cultures and languages. His wanderlust led him to extended research stays in India, Brazil, Japan, Korea and the US, and to repeated visits to CERN, the International Centre for Theoretical Physics in Trieste, the universities of Oxford, Palermo, Vienna and Virginia, and Imperial College London. Numerous international collaborations and friendships derived from these. Klaus was a cosmopolitan. In his final years he was often to be found at the Max Planck Institute for the Physics of Complex Systems in Dresden or at the Gran Sasso National Laboratory. Until near the end, he was working methodically on new ideas and making plans for the future.

Klaus was a highly respected personality, whose acumen and elegance did not conflict with his open-heartedness, curiosity, humility and ability to wonder. We bid farewell and will not forget him.

● *Olaf Lechtenfeld, Leibniz Universität Hannover.*

NEW PRODUCTS

Altera Corporation has released early access design software for Stratix 10 FPGAs and SoCs, targeting 14-nm FPGAs. With this design software, Altera introduces the Hyper-Aware design flow, which includes the Fast Forward Compilation capability that allows customers to perform rapid design performance exploration and attain high levels of performance. For high-performance systems that have strict power budgets, Stratix 10 devices allow up to a 70% reduction in power consumption, compared with Stratix V FPGAs. Altera has also released Quartus II software Arria 10 edition v14.0 for 20 nm FPGA and SoC design. For more information, visit www.alter.com.

Cobham Technical Services has released new parallel-processing software that accelerates one of the major electromagnetic simulation solver options for the Opera-3d

suite of electromagnetic and multi-physics design tools, which use finite element analysis to compute the physical interaction of charged particles with electrostatic or magnetostatic fields. The effects of space charge, self-magnetic fields and relativistic particle flow are included in the analysis. The 3D Space Charge module will be of particular interest to engineers and scientists developing devices such as electron or ion guns. For more details, visit <http://charged-particle-devices.com>.

Hidden has announced the HMT residual gas analyser, offering a single partial-pressure gauge to operate through the full vacuum spectrum from ultra-high vacuum (UHV) through to millitorr, to provide process-gas trend analysis, vacuum background diagnostics and leak detection. The integral dual-detector enables monitoring at high

pressure by a Faraday detector and at lower pressures to UHV by an electron-multiplier detector, giving partial-pressure detection down to 2×10^{-13} mbar, and a total dynamic range in excess of 10 decades. For further information, visit www.HiddenAnalytical.com.

RUBIS-PRECIS / MICROPIERRE / HIGH TECH CERAM have developed new mounted assemblies of high-tech materials for specialized sectors such as space, aerospace, medical and instrumentation. The materials include titanium, biocompatible ceramic, tantalum, tungsten, molybdenum, medical stainless steel, gold and platinum. The assemblies incorporate advanced materials to solve problems such as wear, corrosive environments, use in ultra-high vacuums, high temperature (over 1000 °C) and high pressure (over 1000 bar). For more information, visit www.rubis-precis.com.

Thermal image
with MSX®

Thermal image
without MSX®



FLIR T450sc

High performance at an affordable price

In Research & Development and product/process testing, accuracy and reliability are vitally important. The FLIR T450sc is perfect for capturing and recording thermal distribution and variations in real time, allowing engineers to see and accurately measure heat patterns, dissipation, leakage, and other temperature factors in equipment, products and processes.

The new FLIR T450sc is designed for the user looking for high performance at an affordable price. The FLIR T450sc combines excellent ergonomics with high image quality of 320 x 240 pixels.

The FLIR T450sc is equipped with the innovative Multi Spectral Dynamic Imaging (MSX) feature. MSX allows producing ultra detailed and ultra crisp thermal images. It produces exceptional thermal clarity to highlight exactly where the problem is.

The images displayed may not be representative of the actual resolution of the camera shown. Images for illustrative purposes only.



*After product registration on www.flir.com

For more information please contact:

FLIR Commercial Systems

Luxemburgstraat 2
2321 Meer
Belgium
Tel. : +32 (0) 3665 5100
Fax : +32 (0) 3303 5624
E-mail : flir@flir.com
www.flir.com



YBCO and BSCO SUPERCONDUCTORS

- Levitation Bulk
(disks, squares, custom made shapes)
- Magnetic Shields
- Current Leads
- Tubes for Current Limiters
- Sputtering Targets
- Superconductivity Demo Kits



www.can-superconductors.com

CAN SUPERCONDUCTORS, s.r.o.,
Ringhofferova 66, 251 68 Kamenice,
Czech Republic

PSD Plastic Scintillator for Gamma/Fast Neutron



NEW!



Pulse Shape Discrimination properties enabling the separation of gamma and fast neutron signals on the basis of their timing characteristics using conventional PSD electronics systems.

*Available in cylinders up to 127mm diameter x 150mm long and plates up to 15mm thick x 250mm x 250mm.

ELJEN TECHNOLOGY

1300 W. Broadway Sweetwater Texas USA 79556
Phone: (325) 235-4276 Fax: (325) 235-0701

Website: www.eljentechnology.com