The TRIUMF Newsletter

News from Canada's National Laboratory for Particle and Nuclear Physics

DIRECTOR'S NOTES

Every year, TRIUMF has a three-month period where the accelerators and associated infrastructure undergo extensive maintenance and any planned upgrade. The shutdown period is normally the first three months of the calendar year, but this year, since the regulatory license for the ISAC-II accelerator to send a radioactive beam to an experiment was received at the beginning of January, the shutdown period was delayed to the fourth week of January. This enabled a two-week running period for MAYA, the first ISAC-II experiment. The experiment involved the production of ^{11}Li by the 500 MeV proton beam and acceleration of the lithium beam through ISAC-I and ISAC-II accelerator complex before injection into the MAYA apparatus, which had been brought to TRIUMF from GANIL in time for this experiment. The ISAC-II accelerator worked superbly during the experiment and exciting new data from the reaction ^{11}Li(p,t) ^{9}Li was obtained. The data is sensitive enough to distinguish between the various models that have been proposed to describe the neutron halo nature of this exotic nucleus. This experiment is an excellent start of ISAC-II operations, and I would like to pay a special tribute to Bob Laxdal and his team for their work in bringing the first phase of the ISAC-II accelerator to such a successful conclusion.

Preparations for the installation of the TIGRESS detector array in the ISAC-II experimental hall are well advanced; the first experiment is scheduled for this summer. A recent Canada Foundation for Innovation (CFI) award to construct a neutron wall for ISAC-II experiments is most welcome news; congratulations to the University of Guelph for this award! The precision isotope mass measuring system, TITAN, is now entering its final commissioning phase with first measurements scheduled for this summer.

WHAT'S INSIDE

TRIUMF MAGNETS INSTALLED AT LHC

Shown are six of the 52 Canadian twin-aperture quadrupole magnets installed in one of the straight "collimation" sections of the Large Hadron Collider tunnel at CERN. (Only one of the two beam apertures is visible - at the bottom right.) These magnets were designed and built in a collaborative effort amongst CERN, TRIUMF, and Alstom-Canada.

Recent developments in the FIBIAD ion source, and the relocation of the driver lasers for the laser ion source should lead to significant improvement in isotope variety and intensity for RIB experiments in the coming year.

The μSR program is a very significant component of the TRIUMF research portfolio and has remained competitive over the years due to continuing innovation of experimental technologies; the recent investigations of microscopic behaviour of materials under high pressure is a good illustration. The quest for continuing improvement received a major boost recently with the announcement of a major CFI award to significantly enhance the experimental capabilities of one of the muon beam lines. This, together with the current upgrades on another muon beam line, should provide the basis for μSR innovation for several years to come. Simon Fraser University (SFU) is the lead university for this CFI award, but fifteen other Canadian universities are also associated with it.

The data taking phase of the TWIST experiment - a precision measurement of the muon decay parameters - will be completed this year; the expectation is that all the goals of this challenging experiment will be achieved.

The use of radioisotopes produced at TRIUMF continues to be of great value across a range of scientific disciplines, with the life sciences being a dominant component. This excellent program has been led for many years by Dr. Tom Ruth. Since Tom will retire soon, we are actively seeking a person with a similar vision and commitment to follow him.

TRIUMF has campaigned for some time to establish the Canadian TIER 1 data hub at TRIUMF for the analysis of data, which will soon stream from the LHC at CERN. I am pleased to report that the funds to establish this 23M$ data hub are now in place. TRIUMF wishes to thank both the CFI and the BC provincial government for generously supporting this important project. The lead university for the CFI component is SFU together with nine other collaborating universities.

Canada, through TRIUMF, is making a significant contribution to the T2K experiment at J-PARC. These activities heavily involve TRIUMF expertise in detector technology and high-powered targets. TRIUMF has a busy time ahead to meet its commitments by Spring 2009.

TRIUMF recently applied to the CNSC for renewal of its operating license for another five years from April 2007. I am pleased to report the license was duly awarded.

As articles in this newsletter show, TRIUMF's technology transfer and outreach programs continue to flourish with innovative new ideas. The public perception of TRIUMF is often through such activities so their success is important.

TRIUMF's current funding cycle goes to 2010, so the laboratory has started planning for the years 2010 to 2015. Groups of people have been meeting since last summer to make proposals for how the lab should develop over that period in different science areas. This is a time for reflection and forward vision, and it is in this vein that I warmly welcome TRIUMF's new director Nigel Lockyer. My parting wish is for Nigel and TRIUMF to flourish for many years to come.•

Alan Shotter, TRIUMF Director

For more information on TRIUMF Projects, visit the TRIUMF website at: http://www.triumf.info

ISAC-II GETS NEUTRON WALL VIA CFI GRANT

Future nuclear physics research will be centered on exploring nuclei that are located far from the stability line, especially in neutron-rich regions. It is for this reason that new radioactive-ion beam facilities have been developed, and new ones are being planned. These facilities offer a unique opportunity for the study of subatomic matter to address fundamental questions in nuclear science, such as what is the nature of nuclear matter, what are the origins of the elements observed in the universe, and what are the connections amongst the fundamental forces in nature.

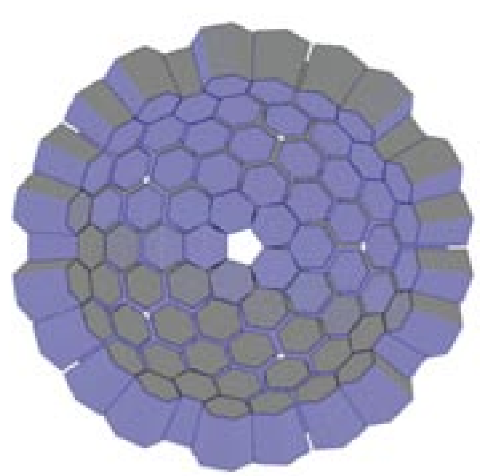
The ISAC and ISAC-II facilities at TRIUMF, the SPIRAL facility at GANIL in France, and the RIKEN facility in Japan are all examples of second-generation radioactive-ion beam facilities that represent major advancements in technology to produce and deliver radioactive beams for experiments. Congruent to the need to continually develop production and accelerator technology in order to boost radioactive-beam intensity, is the need to develop detector capabilities and sensitivities. Many radioactive-beam facilities have concentrated on development of new technologies for gamma-ray and charged-particle detection in order to boost the sensitivity to signatures of new physics. The goal of this project is to develop a major new capability in neutron detection that will result in a world-leading and unique device. An array of neutron detectors, using a liquid scintillator based on a deuterated hydrocarbon, will be built. While deuterated scintillators are not new, never before has an array of detectors based on this technology been developed.

Deuterated scintillators offer the possibility of determining the initial neutron energy by both a pulse-height measurement and time of flight (TOF). A distinct peak is observed in the pulse height spectrum that increases as $E_n^{3/2}$. Combined with the TOF, it will be possible to discriminate between true source multiple neutron events from lower multiplicity events that undergo multiple scattering in the neutron detectors. This will enable us to determine the neutron multiplicity more efficiently, and also perform direct measurements on neutron events in adjacent detectors – rarely achievable with past arrays of neutron detectors. Applications of this will be in fusion evaporation experiments, allowing us to probe neutron-rich nuclei to high angular momentum, and reaction studies, especially those involving neutron-halo nuclei.

The neutron detector array, DESCANT (DEuterated SCintillator Array for Neutron Tagging), would be used primarily for research at ISAC-II in conjunction with the TIGRESS array of gamma-ray detectors. TIGRESS is an $8M project funded by the National Science and Engineering Research Council (NSERC). The design of the detector array is being performed at the University of Guelph. The present design envisions 70 elements of tapered hexagonal detectors located ~50 cm from the target position in the downstream direction, and covering ~π sr. In order to integrate seamlessly into the TIGRESS facility, new 1GHz waveform digitizers (TIG-4G) will be developed at the University of Montreal.

This $1.8M project was approved for funding by CFI in Nov. 2006, and by the Ontario Research Fund in April 2007.•

Paul Garrett



Layout of the individual elements of DESCANT neutron detector designed to work in conjunction with TIGRESS at ISAC-II

12000+ SCINTILLATOR

The strong ties which TRIUMF has forged with local industry were evident in the successful production of more than 12000 plastic scintillator bars in a 3-week run at the Surrey factory of Celco Plastics Ltd in November, 2006. Celco specializes in plastic extrusion technology: extrusion is a manufacturing process in which a material, often plastic, is melted and drawn through a die in a continuous length, which is then cut into pieces to create objects of a required shape and cross section. Plastic weather stripping is a common application of extrusion technology. When TRIUMF needed to cheaply manufacture more than 10000 scintillator bars, (each bar having a length on 2m and a square 1cm by 1cm cross-section with a central hole), for the T2K neutrino project, it was immediately clear that casting or machining the bars was not practicable. By joining forces with Celco, employing a patented formula from another research laboratory, and building on the pioneering experience of the KOPIO project at TRIUMF, techniques were developed which enabled the manufacturing to be carried out by local industry for significantly less cost.

The process involves heating the plastic (polystyrene with additional fluors to make it scintillate when traversed by a charged

CFI AWARDS FUNDS FOR

The Canadian Foundation for Innovation (CFI) has granted a major award to a team led by SFU chemistry professor Paul Percival to build a new M20 muon beam line in TRIUMF's meson hall. The $2.4-million commitment comes from the CFI New Initiatives Fund. Along with the proposed M9B upgrade (see Figure) already committed to be built by TRIUMF, the upgraded M20 beamline will provide advanced beams and facilities to service a broader base of users.

The beam line upgrades have long been sought as the existing lines are outdated and no longer meet researchers' needs. "This upgrade will help to capture the full scientific potential of the muon as a probe," says Percival. "It will satisfy the increasing demands of users, both in availability and quality of muon

BARS SUCCESSFULLY PRODUCED FOR T2K EXPERIMENT

particle) and then forcing the molten plastic through a specially developed die, which imposes the square cross sectional shape and central hole, and covers the outside surface of the bar with a white coating of titanium oxide-loaded plastic. The final product was achieved only after months of development in which TRIUMF scientists and engineers worked closely with Celco staff to optimize the die configuration.

After emerging from the die the continuous length of bar is drawn through a water bath to cool and solidify it, and then cut into 2m lengths. The production line at Celco (with TRIUMF engineer Naimat Khan) is shown in the figure.

At TRIUMF the bars will be built into two detectors (called Fine Grain Detectors or FGDs), which will provide target mass for neutrino interactions and identify and measure the trajectories of the ensuing charged particles. Together with other detectors, such as the TPC also being built in BC, the FGDs will form part of the near detector to be used to in the T2K neutrino oscillation experiment at the JPARC accelerator complex in Japan. The near detector will study the neutrino energy spectrum, flavor content, and interaction rates of the un-oscillated beam used to predict the neutrino interactions 250km away at the far detector, Super-Kamiokande.• *Peter Kitching*

Production line at Celco which produced over 12000 scintillators for T2K. The die is on the lower right, followed by the water bath

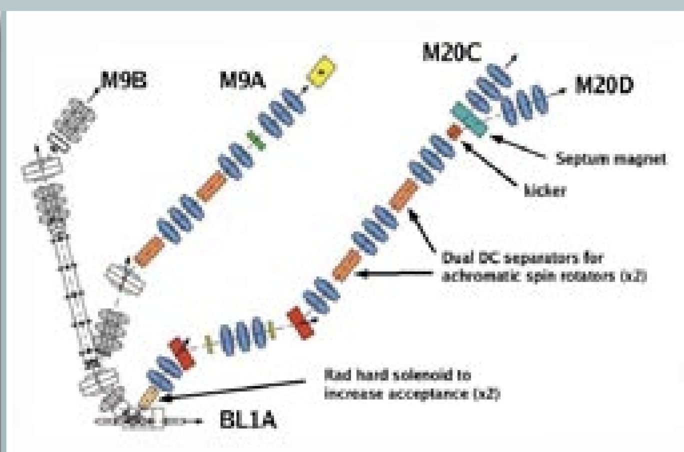
NEW MUON BEAMLINE

beams." The TRIUMF muon beams serve a large international user community in addition to the many users located at institutions in BC and across Canada.

The M20 and M9B upgrades were driven by: a) the phenomenal success of muon spin spectroscopy in yielding information on the local properties of matter unobtainable by other experimental techniques; b) the unique capabilities of the TRIUMF muon spin spectroscopy facilities; c) the increasing number of young Canadian faculty that use muon spin spectroscopy techniques; d) the development of muon spin spectroscopy as a tool for broad-based research programs requiring accessibility to a wider scientific community; and d) the increased scientific opportunities that will be provided by the proposed infrastructure. The new beam lines and facilities should go a long way towards realizing the community's goals for years to come.

Percival's own research uses a positive muon to investigate the chemistry of hydrogen atoms and short-lived free radicals under extreme conditions. A summary of recent work at TRIUMF is described elsewhere in this Newsletter.

Marcello Pavan



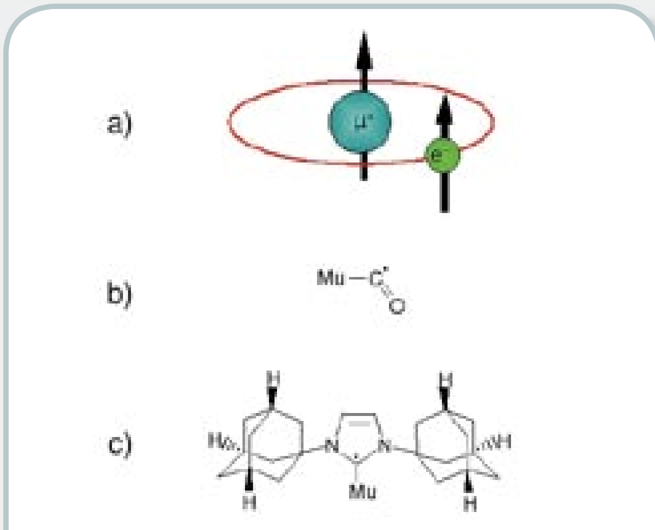
Layout of the proposed M9A and M20C + M20D surface muon beam lines in TRIUMF's Meson Hall. The existing M9B muon beam line is also shown.

MUONIUM CHEMISTRY AT TRIUMF: Free Radical Thinking on the Enviro

The environment has been all over the news lately, with all governments promising action. Ideally their policies should be based on hard science as well as the economic and social consequences of proposed actions. Unfortunately environmental problems typically involve very complex systems. The interdependence of the three major categories of global environmental problems - climate, pollution, and energy production and use – highlight this complexity. Chemistry is at the heart of these problems, blamed for the ills yet essential for developing solutions. One irony among many examples is that molecules originally developed as fire retardants and non-toxic refrigerator fluids were found responsible for ozone depletion in the upper atmosphere.

Research areas which generate data relevant to environmental issues include: atmospheric chemistry (both ground-level smog and stratosphere ozone depletion); energy production without burning fossil fuels; destruction of hazardous waste; alternatives to hazardous chemicals; and efficiency improvements to industrial chemical processes. Interestingly, the muonium chemistry projects at TRIUMF are related to all these areas, connected by the study of free radicals. Free radicals are molecules with one or more unpaired electrons, which usually make them highly reactive and therefore difficult to study. They are key intermediates in many biochemical and chemical reactions, particularly combustion, and in many industries, e.g. paints, petrochemicals and polymers.

Modern methods of studying short-lived reaction intermediates mostly involve fast lasers and optical spectroscopy. However, it is the magnetic properties of free radicals which are characteristic, and the most appropriate technique (electron spin resonance) has technical requirements which significantly limit its applicability to transient radicals. Happily, many of these limitations do not apply to muon spin spectroscopy (muon spin rotation, μSR, and muon avoided level-crossing resonance, μLCR). The chemical significance of the muon is that it is the nucleus of the hydrogen atom analogue called *muonium* (Mu $=\mu^+e^-$). Mu can therefore be used to study H atom chemistry, and, most importantly, to study muoniated free radicals, i.e. free radicals in which an H atom has been formally replaced by a Mu. Almost all organic free radicals contain one or more H atoms, so by creating the analogous muoniated radical we can use the implanted muon to probe the free radical's properties or use it as a tracer to monitor the chemical reactions of the radical.



a) Muonium is like a H atom but with a muon as nucleus
b) A small muoniated radical, MuCO.
c) The Mu adduct of 1,3-bis(adamantyl)imidazol-2-ylidene (a name only a cheist could love!).

By tuning the energy, a beam of muons introduced into almost any target vessel, and as the muons slow to a stop in the sample material some of them pick up electrons to form muonium. Thus muonium chemistry at TRIUMF can be studied in gases, liquids, solids, under all sorts of conditions. A prime example that is extremely difficult to study by conventional means is superheated water. Such conditions exist in supercritical water incinerators (proposed for the destruction of toxic waste, including chemical weapons) and the heat transport systems of pressurized water nuclear reactors. Free radicals are key intermediates in the pyrolysis and combustion of organic materials, and when that material is nerve gas, you really want to understand the mechanism! Similarly, free radicals are inevitably produced by radiolysis in the primary water cycle of PWR reactors (such as the CANDU type). A good understanding of water chemistry is needed to avoid build up of hydrogen gas and to minimize corrosion of piping and fuel cladding. The SFU muonium chemistry group has been studying Mu reactions and free radicals in water at temperatures up to 450°C and pressures up to 400 bar. Not only is there no equivalent data on H atoms, the next generation of PWR reactors are being designed to run at even higher temperatures. The SFU group's work has shown that simple extrapolation of kinetic data from lower temperatures leads to significant errors. The experiments were done with muonium, but the explanation is generally applicable – the reaction kinetics change as the density of the medium changes from liquid to gas-like.

The UBC muonium chemistry group is renowned for fundamental studies of reaction kinetics in the gas phase. Their latest publication deals with the reaction of Mu with carbon monoxide to form the radical MuCO. The analogous reaction for H is important for atmospheric and combustion chemistry. Even more important is the small size of the radical, which allows high-level quantum calculations of reaction rates which

TRIUMF SCIENTIST WI

TRIUMF Research Scientist Dr. Richard Helmer was among the winners of the inaugural $250,000 NSERC John C. Polanyi Award for their work in the Sudbury Neutrino Observatory (SNO) collaboration. Their ground-breaking research on neutrinos solved a 30-year-old scientific puzzle showing definitively that neutrinos had a small mass.

The Natural Sciences and Engineering Research Council (NSERC) created the prize in honour of Canadian scientist Dr. John Polanyi, winner of the 1986 Nobel Prize for Chemistry. The Award recognizes

onment

can be tested against the data. In recent years the same group has turned to a more applied project, studying hydrocarbon free radicals in zeolites, which are widely used as catalysts in the petrochemical industry. Understanding how reaction intermediates bind to the interior of a porous catalyst is essential to the development of new catalysts which work under milder conditions and avoid unwanted by-products.

"Green chemistry" considerations are increasingly important to the chemical industry. A simple example is the trend away from volatile organic compounds as solvents. Supercritical carbon dioxide has long been viewed as an alternative solvent for separation purposes (decaffeination of coffee, degreasing mechanical and electronic parts, even dry cleaning of clothes), but its potential use as reaction medium is limited by lack of knowledge of its effect on kinetics and mechanisms. The Mount Allison muonium chemistry group is pursuing studies in this area. In addition they are investigating radical chemistry in a newer class of "green" solvents, ionic liquids. Ionic liquids are salts which are liquid below 100°C. They are renowned for low volatility, but their versatility stems from the ability to tune other molecular properties by small changes in their chemical composition. Dr. Jason Clyburne, Canada Research Chair in Environmental Studies and Materials at St. Mary's University, works in this area, and he collaborates with both the Mount Allision and SFU groups.•

Paul Percival

NS NEW NSERC AWARD

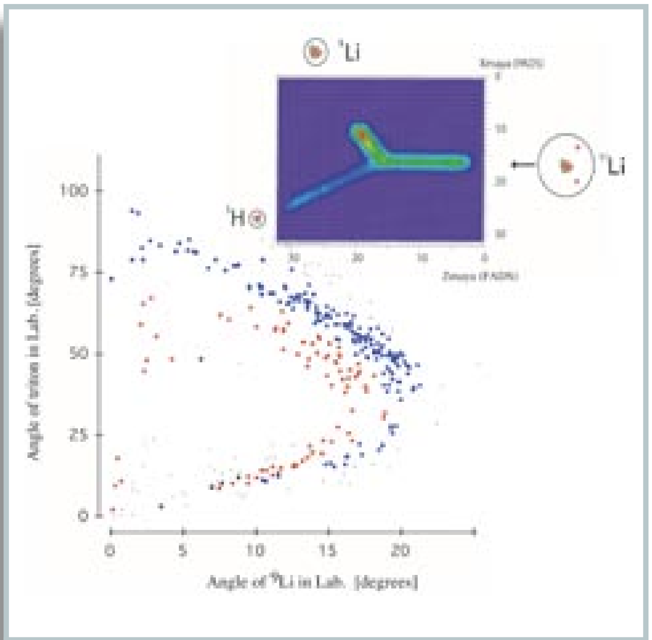
a recent outstanding advance made by Canadian researchers in any field of the natural sciences or engineering.

"The entire SNO team feels greatly honoured to have been awarded this prize," said Dr. Helmer, who oversaw the design, fabrication, installation and commissioning of several key detector components. "I was fortunate to have joined the collaboration at a time when contributions from TRIUMF in its infrastructure role supporting the Canadian Subatomic Physics community were extremely important." •

Marcello Pavan

RESEARCH ERA AT ISAC-II BEGINS WITH MAYA

Nuclear structure physics are undergoing a renaissance with a new type of beam, radioactive isotope beams (RIB). Many new discoveries have been made that changed the view of nuclear structure using RIB. New structures such as neutron halo, neutron skin, new magic numbers appears only off the stability line, to name a few. The new experimental field of nuclear astrophysics, experimental studies of nuclear reactions relevant to nucleosynthesis and other phenomena in the universe, has been opened. ISAC-II is a new facility that gives high-quality RIBs at energies higher than the Coulomb barrier and thus provides new opportunity to promote new structure physics of nuclei far from the stability line.



A typical track in MAYA for the reaction $^{11}Li+p \rightarrow {}^{9}Li+{}^{3}H$ superimposed over a plot showing the angular correlation between the final state ^{9}Li and ^{3}H nuclei. The two prominent bands correspond to transitions to the ^{9}Li ground state and 2.69 MeV excited state.

The first experiment ISAC-II was to study the pairing correlation between two neutrons in the most pronounced halo nucleus, ^{11}Li. Many of the two-neutron halo nuclei have borromean[1] structure and thus the correlation between two neutrons plays important role in its binding and the structure. Although several break-up experiments have been done, the correlation between the two halo neutrons is not well understood yet. A so called two-neutron transfer reaction $^{11}Li +p \rightarrow {}^{9}Li +t$, that is believed to be the best tool for studying two-nucleon correlation in nuclei, has been studied at beam energy of 3.6MeV/A immediately after the commissioning of ISAC-II. An accelerated beam of ^{11}Li with intensity about 2000 /s was delivered stably to the MAYA active target detector. MAYA is operated with isobutane gas of 150 mbar thus providing the proton target. A silicon-detector array and a CsI array were also equipped in MAYA for detection of forward going high-energy particles that leave gas detection area of MAYA. The active target provides advantages for efficient detection of the reaction: almost 4π detection of the reaction, effectively thickest usable target, and efficient detection of low-energy recoil particles. The experiment has been performed under the collaboration between GANIL(France), ANL(US) and TRIUMF group and some amount of data has been accumulated during the commissioning run. The analysis of the data is in progress. An example of the $^{11}Li +p \rightarrow {}^{9}Li + t$ reaction event in MAYA is presented in the figure, together with the observed kinematic loci of (p,t) reaction.

The success of the first delivery and the first experiment at ISAC-II presents a promise for the future studies of nuclear physics and nuclear astrophysics.•

Isao Tanihata

[1] *borromean nucleus*: a bound nucleus with three-body character. Any of two constituents among three does not bind the nucleus, but the nucleus does bind with the three constituents together.

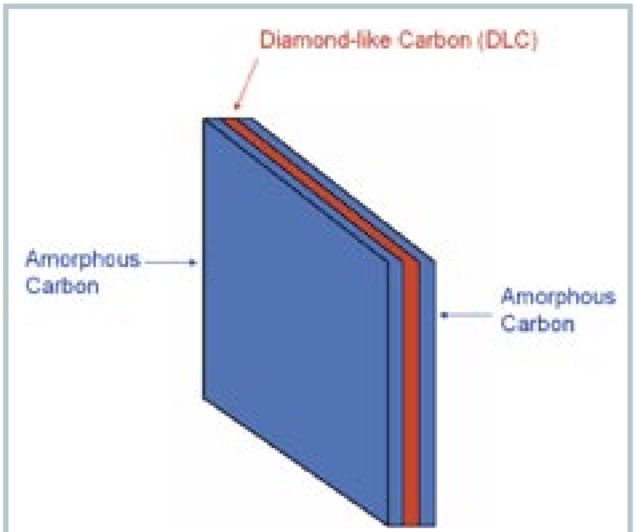
TRIUMF SCIENTISTS DEVELOP INNOVATIVE MULTI-LAYER CARBON FILM

Carbon thin films are used in a variety of applications, including beam strippers, particle accelerator targets, X-ray and extreme UV filters, charge-changing targets, and in-line attenuators. Many of these applications require that the carbon thin films be without a supporting substrate. Traditional self-supporting carbon thin films can be produced using a variety of methods. However, conventional techniques have certain limitations, particularly in regards to high beam current applications which may damage fragile stripping or extraction foils. Films made only of amorphous carbon film dissipate generated heat efficiently, but are mechanically weak and have a short lifetime under intense particle beams. In contrast, diamond-like carbon (DLC) film is very strong and durable but provides less efficient heat dissipation.

TRIUMF scientists, Dr. Stefan Zeisler and Vinder Jaggi, have developed an innovative carbon thin film that addresses the shortcomings of current technologies. Their product comprises alternating layers of nano-crystalline DLC and amorphous carbon, combining the mechanical strength of DLC and the heat dissipation efficiency of amorphous carbon. As a result, this carbon film is ideal in beam strippers. Using TRIUMF facilities, including a 3-Joule laser ablation system and a thermal evaporation chamber, the highly skilled team at TRIUMF is able to fabricate high quality layers of amorphous and DLC carbon films.

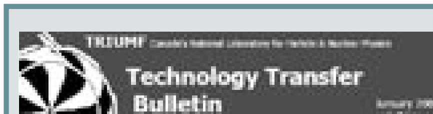
A wide range of layer configurations is possible, depending on the combination of properties desired for the final product. While TRIUMF offers several standard dimensions, it is also able to accommodate custom orders of different specifications. One method to produce a carbon thin film of three layers, for example, involves a series of steps. The first is to prepare an appropriate substrate, typically a highly polished glass or sapphire substrate, before applying a layer of soluble parting or release agent. Next, the substrates are placed in a thermal evaporation chamber, where rods of graphite are evaporated. The evaporated carbon atoms are deposited on the release agent to form the first layer of amorphous carbon. Then, the substrate is transferred to another chamber, where an ablation laser is directed on a rotating graphite disc in order to vaporize the carbon atoms. These atoms are deposited on top of the amorphous carbon layer to form the nano-crystalline DLC layer. Finally, the substrate is returned to the evaporation chamber to have a second amorphous carbon layer deposited on the DLC layer. The composite carbon film is then annealed and removed from the substrate. The composite carbon films that are produced exhibit improved initial mechanical properties as well as improved lifetime, thereby reducing maintenance and operator exposure.

A representative of the Indian government, Vinder Jaggi, and Dr. Stefan Zeisler promote multi-layer carbon films with diamond-like carbon at their booth at the Asian Particle Accelerator Conference.



One configuration of alternating layers of amorphous carbon and diamond-like carbon.

Stefan and Vinder recently brought their innovative product to India at the Asian Particle Accelerator Conference 2007, held in Indore at the Raja Ramanna Centre for Advanced Technology. The conference was an opportunity for scientists and engineers from around the world to share their experiences in the particle accelerator field and discuss the latest developments and future direction for research. The multi-layer carbon films were showcased at the conference in an exhibit, which attracted a great deal of attention and numerous expressions of interest from potential customers. Samples of the product have been sent to several interested parties, including Michigan State University and Fermilab. • *Roshena Huang*



For more information about Applied Science at TRIUMF, visit the Technology Transfer website at:

http://www.triumf.info/public/tech_transfer/tech_transfer_5.php

OUTREACH NEWS

Once again TRIUMF played host to close to one hundred high school teachers from across British Columbia on October 20, 2006. The Third Fall Professional Development Day was run by the BC Association of Physics Teachers and the BC Science Teachers Association, and featured a full day of lectures, tours, and hands-on activities. The program focussed more on topics accessible to Grade 9 and 10 teachers and by all accounts the event was very well received. As a result of the program's success, BCAPT and the BCScTA have decided to continue the Fall Pro-D Day as a permanent biennial event.

TRIUMF's outreach program is beginning to attract national attention. One indication is that the Graduate Diploma Science Communication program at Laurentian University in Ontario has offered to send TRIUMF a student for internship training. Alfredo Franco-Cea, a chemistry graduate at UBC, will be at TRIUMF from mid-April to mid-June to assist with different outreach activities, in particular the public tours with his notably suave Mexican accent.

Another indication is that TRIUMF is a key organizer for the Special Policy Session on Public Outreach at the next CAP Congress in Saskatoon on June 19. The Special Session will feature Discovery Channel host Jay Ingram and noted science writer Professor Lawrence Krauss, who will start off a series of talks from outreach program directors from across Canada. The goal of the Outreach Policy Session is to bring together organizations devoted to physics outreach and begin fostering pan-Canadian working relationships. TRIUMF and the Perimeter Institute are seen as key national players in this regard.•

Marcello Pavan

High School Fellowships: http://www.bcinnovationcouncil.com/programs/scholarships.php
Quarknet: http://quarknet.fnal.gov/
Graduate Diploma Science Communication: http://www.sciencecommunication.ca/
CAP Congress: http://cap07.usask.ca/

High School teachers at the October 2006 Professional Development Day during one of the many hands-on activities offered.

TUEC: New Executive and Five-year Plan News

With the first discussions on the next 5-year plan for TRIUMF underway and a new director selected, 2007 promises to be a busy year for TRIUMF users and staff. Discussions were vivid at the TRIUMF Users Group Annual General Meeting (AGM), which was held on Dec. 6, 2006, immediately following the Subatomic Physics EEC and prior to the Molecular and Materials Science EEC. As usual at the AGM, the results of the TRIUMF Users' Executive Committee (TUEC) elections were made public.

For 2007, your TUEC membership will be:

Chair	
Uwe Greife	Colorado School of Mines
Chair Elect	
David Kulp	Georgia Institute of Technology
Past Chair	
Paul Garrett	University of Guelph
Members:	
Christopher Hearty	UBC/IPP
Robert McPherson	University of Victoria/IPP
Barry Davids	TRIUMF
Byron Jennings	TRIUMF
Liaison Officer	
Martin Comyn	TRIUMF

This year's meeting was otherwise completely dedicated to presentations from the different scientific areas represented at and by TRIUMF. Ad-hoc working groups had been formed in the previous months to discuss the dreams and needs of users grouped in: ISAC physics and infrastructure, accelerator R&D, theory, high energy physics, neutrino physics, molecular and materials science, life sciences, detector R&D, high performance computing, SNOLAB, offsite support and outreach. The reports from the individual groups conveyed the uniform feeling that all groups need more resources to perform at the optimum, but also confirmed that if given those resources significant scientific achievements could be expected. TUEC has collected the input from the working groups and will present them in May to the new director for further consideration and discussion. In order to provide a forum for individual users to interact with the new management, we have decided to continue with our fresh tradition of a summer users' meeting. It will be held on July 8, 2007, in between the Subatomic Physics EEC and the TRIUMF Summer School. A call will soon go out to the ad-hoc working groups to suggest speakers that can highlight recent accomplishments in the context of how the future of TRIUMF may shape up.•

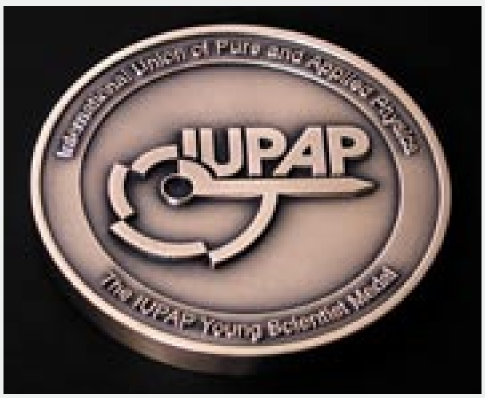
Uwe Greife

To join TUG or contact TUEC members, please visit the TRIUMF Users' Group website at: http://www.triumf.ca/tug/

TRIUMF HELPS IUPAP LAUNCH MEDAL PROGRAM

At the October 2005 General Assembly in Cape Town, South Africa, the International Union of Pure and Applied Physics (IUPAP) agreed to institute a program to recognize and encourage outstanding young physicists by awarding an IUPAP Medal and cash prize of $1000US. The awards will be made through the IUPAP Commissions. Each Commission is responsible for one of the many physics sub-disciplines and will choose a winner through their individual selection procedures. The commissions will also decide the frequency of the award.

As the president of IUPAP, former TRIUMF Director Alan Astbury of the University of Victoria sought help from the TRIUMF to expedite implementing the scheme. Initially the plan was to manufacture the medals in the TRIUMF Machine Shop ; however, it became clear that a better-looking medal could be made by pressing from a mold to produce embossed lettering.



A survey of the medal manufacturing capabilities in Vancouver discovered an impressive small company, *Pressed Metal Products Limited*, owned and operated by Alan Trammel. Bronze is the chosen metal. Currently in collaboration with TRIUMF, the company has produced 15 medals for the following commissions, Statistical Physics (C3), Cosmic Ray Physics (C4), Low Temperature Physics (C5), Biological Physics (C6), Magnetism (C9), Particles and Fields (C11), Nuclear Physics (C12), Atomic Molecular and Optical Physics (C15), Plasma Physics (C16), Mathematical Physics (C18), Astrophysics (C19), Computational Physics (C20), and the Affiliated Commission on Medical Physics (AC4). The front of the medal is shown in the figure. The reverse identifies the commission, the winner's name, and the year it was won, which are engraved by the company.

Four awards were made in 2006, and it is fair to say that with the excellent help of Shirley Reeve and Mindy Hapke at TRIUMF, manufacture has stayed ahead of the winner selection. IUPAP is very grateful to TRIUMF for its help in launching a program which will reward outstanding young physicists.•

Marcello Pavan

BOARD CHAIR WELCOMES NEW DIRECTOR

It is with mixed emotions that I say goodbye to one valued colleague and welcome another.

In bidding farewell to Alan Shotter as he leaves the position of Director of TRIUMF on April 30, I am sure I speak for everyone at TRIUMF when I thank him most sincerely for his service. Alan's leadership over the past six years has been invaluable and his contribution to the life of TRIUMF has been outstanding. Alan told me he plans to continue his research at TRIUMF and we will look forward to his visits. Alan, we wish you all the best in the future.

On May 1, TRIUMF will welcome Nigel Lockyer as its new Director. Nigel comes to TRIUMF from the University of Pennsylvania where he served as Professor of Physics. His area of research is high energy particle physics, most recently at Fermilab. In addition, he has served on many important national and international committees, including CFI and NSERC committees.

On behalf of everyone at TRIUMF, I want to welcome Nigel and wish him well as he meets the challenges ahead.•

Feridun Hamdullahpur
Chair, TRIUMF Board of Management

Important Upcoming Dates

* see insert

ACOT	Advisory Committee on TRIUMF Meeting	May 11-12	TRIUMF
MMSEEC*	Molecular and Materials Science Experiments Evaluation	June 7-8	TRIUMF
CAP	CAP Congress - University of Saskatchewan	June 17-21	Saskatoon
BOM	TRIUMF Board of Management Meeting	June 22	TRIUMF
SAPEEC*	Subatomic Experiments Evaluation Committee Meeting	July 6-7	TRIUMF
TUG*	TRIUMF Users Group General Meeting	July 8	TRIUMF
TSI*	TRIUMF Summer Institute	July 9-20	TRIUMF
CHEP07	Computing in High Energy and Nuclear Physics	Sept 2-7	Victoria

TRIUMF is funded by a contribution through the National Research Council of Canada.

Operated as a joint venture by:
University of Alberta
University of British Columbia
Carleton University
Simon Fraser University
Université de Montréal
University of Toronto
University of Victoria

Associate Members:
University of Guelph
University of Manitoba
McMaster University
Queens University
University of Regina
Saint Mary's University

Contact Information:

TRIUMF: 4004 Wesbrook Mall,
Vancouver, B.C.
Canada V6T 2A3

Telephone……………….604-222-1047
Fax………………………604-222-1074
Website……………….www.triumf.info

Director:	A.C. Shotter	director@triumf.ca
Associate Director/Science:	J-M. Poutissou	sciencediv@triumf.ca
Engineering Division:	E. Blackmore	engineering@triumf.ca
Accelerator Division:	P. Schmor	acceldiv@triumf.ca
Technology Transfer:	P. Gardner	techtrans@triumf.ca
Administration and HR:	J. Hanlon	admin@triumf.ca
Finance:	S. Reeve	finance@triumf.ca
Outreach/Communications:	M.M. Pavan	outreach@triumf.ca
Student Program:	D. Giasson	student@triumf.ca

TRIUMF Beam Schedule

The current TRIUMF beam schedule is available on the Web at:

http://www.triumf.info/facility/experimenters/

Users should subscribe to the automated update notification to receive notice of changes which may be required during the period already scheduled.

The TRIUMF Newsletter is published bi-annually, and is available online at: www.triumf.info/public/news/newsletters.php
If you wish to subscribe to this newsletter in electronic or printed form, please visit: http://www.triumf.info/subscriptions
Send any Newsletter queries or comments to: newsletter@triumf.ca

Design/layout by D. Giasson