

Nuclear Physics technical review completed

The annual visit of the Nuclear Physics Technical Review Committee occurred on May 5 and 6 when six international researchers reviewed TASC programs and operation.

This year's committee members were: Ed Tomusiak, Saskatchewan (Chair); Dave Clark, LBL; Ernst Roeckl, GSI; Yves Qu  r  , Ecole Polytechnique; Joe Natowitz, Texas A&M; and Peter Twin, Liverpool. TASC's Guy Savard was scientific secretary.

Four of the 17 presenters this year were not TASC staff, but users. They were: Simon Mullins of McMaster University; Jack Cornett of Environmental Research Branch, CRL; John Elliot of Systems Chemistry and Corrosion Branch, CRL; and Petru Lucuta of Fuel Materials Branch, CRL.

The committee's written report is expected to be delivered to TASC Director, John Hardy, in June.

Speakers and their titles were:

Jim Geiger

Overview of Nuclear Physics Research at TASC

David Bowman
Nuclear Reactions

David Ward
Nuclear Spectroscopy with the 8π Spectrometer—
Introduction and Overview

Victor Janzen
Intruder Structures in $A=110$ Nuclei

Simon Mullins
Superdeformation near $A=140$

David Radford
TRIGAM

Vern Koslowsky
Exotic Nuclei and Weak Interactions

Guy Savard
Canadian Penning-Trap Mass Spectrometer

Ian Towner
Electromagnetic Corrections for Superallowed Fermi Beta
Decay

Jim Forster
Interactions of Energetic Heavy Ions with Matter

Bob Andrews
AMS Technical Development

Jack Cornett
AMS Applications

John Elliot
Radiolysis Studies

Facility report

Experiments during May included: four 8- π experiments; a cyclotron beam-development run; and irradiation of simulated reactor fuel samples.

Beamline vacuum problems delayed startup of one 8- π experiment, which was also interrupted by Tandem high-voltage problems for a half day.

The Tandem later produced a record silicon-30 beam energy of 178 MeV, with adequate current from a cone of natural silicon.

Three beams that test the limits of the cyclotron were produced this month: 18 MeV/A carbon-12 (which required a very low magnetic field of 2.27 Tesla); 39 MeV/A chlorine-37; and 27 MeV/A bromine-79. This run was delayed when an insulator failed on the high-voltage deflector. However, a record-high 77 kilovolts was available on the deflector only 24 hours later, following replacement of the failed component.

Beams produced during May were:

Ion	Energy (MeV)
^{12}C	216
^{23}Na	120
^{30}Si	178
^{35}Cl	1365
^{48}T	220
^{58}Ni	235
^{79}Br	2133
^{127}I	72

Petru Lucuta
Simfuel Studies

Hermann Schmeing
Overview of TASC Operation and Development

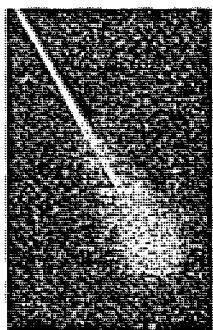
Bill Diamond
New Perspectives in Vacuum High-Voltage Insulation

John Wills
ECR Ion-Source Development.

AMS group provides crucial data Sizing up fiery meteors

CRL's accelerator mass spectrometry (AMS) group recently provided data crucial for size estimates of the Peekskill meteorite, which crashed through the trunk of a car in Peekskill, New York, in October, 1992. The AMS group, composed of members from both TASC Division and Environmental Research Branch, CRL, is part of an international collaboration from nine institutions studying the celestial visitor.

Using the TASC Tandem accelerator, the CRL group measured the number of atoms of chlorine-36 in both the metal and silicates of a small sample of the 12 kg meteorite. The results were compared to those of another meteorite whose pre-atmospheric meteor size was known. A radius of about 50 centimetres was thus deduced for the meteor phase of the Peekskill meteorite, which agrees with size estimates from video recordings taken during its passage through the atmosphere.



Brighter than the moon, the Peekskill fireball had been videotaped during its 700 kilometre flight over north-eastern USA by numerous amateurs in several states. Using these video recordings, members of Canada's Meteorite Impact Advisory Committee were able to triangulate the meteor's path to determine its origin and speed; they report an origin in the asteroid belt between Mars and Jupiter and a speed of 18,000 kilometres an hour as it entered Earth's atmosphere.

Measurements of the content of helium-3, neon-21 and argon-38 made elsewhere imply the object originated from a collision about 27 million years ago.

Writing to TASC's Bob Andrews, Rutgers University professor Gregory Herzog complimented the AMS group on providing an "excellent set of chlorine-36 measurements," adding "I was very impressed by the high precision and low blanks that you achieved." A summary of the collaborative study of the meteorite will be presented at the Meteoritical Society in Prague in 1994 July.

In a *Globe and Mail* article of 28 May describing the recovery of the meteorite, Peter Brown, part of the study team from the University of Western Ontario, was quoted as saying "This was the equivalent of sending a billion-dollar probe into space and capturing an asteroid."

Summer students tackle TASC projects Science Academy award

The Deep River Science Academy, which has provided students with summer science experiences for seven years, is the Ontario winner of the 1993-94 National Award for Excellence in Business-Education Partnerships.

Organized by the Conference Board of Canada and funded by the Stentor Alliance, the award was presented recently to representatives of the DRSA and the three industry partners: AECL Research, Petawawa National Forestry Institute, and Bubble Technologies Inc.

TASC has provided an academy science project every summer, thanks to its director, John Hardy, who helped found the academy and is board chairman.

The academy accepts 42 students each summer to study science and to work on actual science projects during the six-week session. Students receive two high-school credits for the course.

To date, 250 students have graduated from the academy, with 95% taking up science and engineering programs at university.

The unique concept has been so successful that two other Canadian campuses, in Manitoba and British Columbia, are now in operation. A total of 40 university student tutors is employed by the three campuses each summer.



DEEP RIVER
SCIENCE
ACADEMY

Since no student from the Upper Ottawa Valley has yet attended the academy, the \$1000 award from the Conference Board will be used to provide two scholarships for students from this area to attend either the Manitoba or B.C. campus this summer.

May experiments

Experiment Development of new cyclotron beams of carbon-12, chlorine-35 and bromine-79. These three beams bring to 77 the total number produced from the superconducting cyclotron.

Researchers TASCC Beam Commissioning Team

Beams 18 MeV/A ^{12}C ; 39 MeV/A ^{35}Cl ; 27 MeV/A ^{79}Br

Duration 6 days

Experiment Search for highly deformed bands in tungsten-176 with the 8π spectrometer. A very strong ridge was observed in the γ - γ matrix, with spacing consistent with deformation of the first predicted minimum. No evidence for the predicted second or third more highly deformed minima was seen.

Researchers T.E. Drake, M. Cromaz and J. DeGraaf (*U. of Toronto*); S. Pilotte (*Ottawa University*); S. Flibotte, S.M. Mullins and J.L. Rodriguez (*McMaster University*); D. Ward, A. Galindo-Uribarri and D.C. Radford (*TASCC*)

Beam 178 MeV ^{30}Si

Duration 4 days

Experiment Measurement of octupole correlations in tellurium-110 and xenon-114 with the 8π spectrometer.

Researchers V.P. Janzen, A. Galindo-Uribarri, D.C. Radford and D. Ward (*TASCC*); T.E. Drake, M. Cromaz and J. DeGraaf (*U. of Toronto*); S. Flibotte and J.L. Rodriguez (*McMaster University*)

Beam 235 MeV ^{58}Ni

Duration 4 days

Experiment Search for superdeformation in dysprosium-146 with the 8π spectrometer. Some evidence was found for discrete-line candidate bands but further analysis is required.

Researchers S.M. Mullins, S. Flibotte, J.L. Rodriguez and J.C. Waddington (*McMaster University*); V.P. Janzen, D.C. Radford, A. Galindo-Uribarri and D. Ward (*TASCC*); T.E. Drake (*U. of Toronto*)

Beam 120 MeV ^{23}Na

Duration 2 days

Experiment Test of oven system to be used in studying simulated fission-fragment damage in CANDU fuel and related materials at high temperature.

Researchers P.G. Lucuta and R.A. Verrall (*Fuel Materials Branch, CRL*); H.R. Andrews (*TASCC*)

Beam 72 MeV ^{127}I

Duration 2 days

Experiment Search for superdeformation in erbium-154 with the 8π spectrometer.

Researchers S. Flibotte, S.M. Mullins, G. Hackman, J.R. Rewcasten and S. Marshall (*McMaster University*); D.C. Radford and D. Ward (*TASCC*); J. DeGraaf and M. Cromaz (*U. of Toronto*)

Beam 220 MeV ^{48}Ti

Duration 4 days

"The freedom to innovate is the freedom to dare, the freedom to risk, the freedom to succeed – and indeed the freedom to fail.

RICHARD MAHONEY, "CEO, MONSANTO, 1993

Next month

- Development of new cyclotron beams
- ERD counter development
- Time-of-flight calibrations
- AMS sample measurements
- Spectroscopy of thulium-155
- DSAM measurements on promethium-133
- Study of entrance-channel effects in samarium-140
- Spectroscopic studies of tin-112
- Beta-decay studies and precise half-life measurements of oxygen-14
- Study of coulex in second well
- Spectroscopy of lutetium-162

Facility operating record

Elapsed Time (Year-to-date) 3575 h

Beam Available	
Tandem Only	2069.6
Tandem + Cyclotron	315
Beam Development	643.9
Planned Shutdown	336
Forced Shutdown	210.5

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