



1995 February Vol. 9 No. 2

CA9600654

INIS-mf--14862

NEWSLETTER

INIS-mf--

TASCC

News about Chalk River's Tandem Accelerator Superconducting Cyclotron facility for users and potential users

Printed 1995 April 7

Large SEE team uses TASCC beams

A demonstration run at TASCC this month showed the usefulness of high-energy heavy-ion beams in simulating the cosmic-ray environment in space.

In a six-day test with different TASCC beams, experimenters and observers from six research institutions irradiated electronic chips and performed charge-collection experiments on specially fabricated test devices.

Low-energy beams from the Tandem accelerator and high-energy beams boosted by the superconducting cyclotron were used for the tests.

This "showcase" experiment was jointly sponsored by AECL, the Defence Research Establishment, Ottawa and the Naval Research Laboratory, Washington and attracted 20 scientists and engineers.

Important results were obtained confirming that heavy ions at TASCC energies, which recreate the cosmic-ray environment, are significantly more damaging than the lower-energy beams of equivalent LET presently used elsewhere for cosmic-ray simulation.

These measurements support the growing realization that ion range and/or total energy are important parameters, in addition to LET, for predicting single-event effects in semiconductor devices.

Retirement dinner held for Jim Geiger

A retirement dinner was held for Jim Geiger, former manager of TASCC's Nuclear Physics branch, February 25.

Although Jim officially retired last July, he continues working at TASCC as a Researcher Emeritus. Organizers obviously were not rushed in

Facility report

Six experimental runs were scheduled during February, including three six-day runs and a five-day run.

A new beam was produced by the cyclotron, 34.5 MeV-per-nucleon nickel-58, bringing the total beams available from the machine to 90.

The Tandem tank was opened during a three-day facility maintenance for scheduled servicing. Spark-protection on the gridded-lens supply was upgraded during the shutdown.

A 25-minute power outage on Tuesday 7 February resulted in four hours of lost beam time. A further three hours were lost at the start of a cyclotron run when one of four deionized water pumps malfunctioned.

Beams produced during February were:

Ion	Energy (MeV)
^{28}Si	115
^{30}S	156
$^{35,36,37}\text{Cl}$	100
^{51}V	225-235
^{58}Ni	282 & 2001
^{76}Ge	319
^{127}I	72 & 1905
^{197}Au	266 & 1970

arranging an official retirement dinner!

Jim's dinner, held in Deep River, attracted 100 friends and former colleagues to congratulate him on his many valuable contributions to AECL and to wish him and his family well.

As John Hardy, Master-of-Ceremonies for the evening, explained, "Jim always brings a measure of coolness and sanity to everything he's involved with."

Modular approach speeds rf construction time

The modular approach to rebuilding cyclotron rf control electronics has resulted in increased speed of construction and commissioning, as well as vastly improved serviceability, according to a report to the TASCSC Steering Committee this month by technologist Peter Bunge.

The first modules were built for cyclotron beam-buncher tuning and injection-beam phase control. They include: an r.f. splitter/switch; levelled 360-degree phase shifters; phase detectors, an AFC (Automatic Frequency Control) module; a levelling r.f. amplifier; a tuner driver; and a frequency doubler.

All modules are active, with levelling and linearity built in for ease of use.

An AFC chassis, just completed for the cyclotron, incorporates nine of the above modules plus new balance-capacitor tracking modules.

With this modular approach, 32 noise-filter modules in four chassis have also been built for the cyclotron's two radial diagnostic probes.

All modules are built to Eurocard standard and are field-replaceable in-service.

Peter Bunge retires

TASCSC electronics technologist Peter Bunge retired February 28. Although Peter had only worked at TASCSC for five years, his expertise, gathered prior to joining AECL and in several branches at Chalk River Laboratories, was invaluable to the cyclotron r.f. group.

In particular, Peter's broad knowledge of electronics and his attention to detail enabled the r.f. system to be improved greatly through redesign of many control components into modular form. (See earlier this page.)

Peter and his wife Janice, who also retired from CRL the same day, plan to enjoy retirement on their new 36-foot sailboat.

New technician for Nuclear Physics branch

Dave Beeching, a technologist formerly with Westinghouse Canada, has joined TASCSC in the position previously held by the late Wayne Perry. Dave will work with the ISOL/Penning trap group in close collaboration with Mike Watson.

Dave's mechanical and toolmaking experience will be put to immediate use in commissioning the vacuum system for the Canadian Penning trap mass spectrometer project.

February experiments

Experiment	Study of single-event effects on large-scale integrated circuits with energetic heavy ions.
Researchers	H.R. Andrews, W.G. Davies, J.S. Geiger, E. Hagberg, V.P. Janzen and V.T. Koslowsky (TASCSC); W. Stapor (National Research Labs, Washington); A. Knudson and P. McDonald (NRL/Sachs Freeman Associates); B. Carkhuff and J. Kinnison (Applied Physics Laboratories); H. Dussault (Rome Labs); J. Kirshman and R. Koga (Aerospace Corporation); E. Stassinopoulis and C. Stauffer (NASA); M. Simons (Defense Nuclear Agency/NRL); T. Cousins, E. Horvath and T. Jones (Defense Research Establishment, Ottawa); J. Apperley, D. Bush and M. Howden (SPAR Aerospace); A. Ng (Canadian Space Agency); D. Mackay (Thompson and Nielson); R. Woolley (Advanced Information Technology)
Beams	266 MeV and 10 MeV/A ^{197}Au ; 282 MeV and 34.5 MeV/A ^{58}Ni ; 15 MeV/A ^{127}I
Duration	6 days

Experiment Spectroscopy of A=60 nuclei populated in the $^{28}\text{Si} + ^{40}\text{Ca}$ reaction at $E_b=115$ MeV with the 4π miniball and 8π spectrometer. Preliminary analysis reveals evidence for high-spin structures never before seen in this mass region. For example, in the $^{40}\text{C}(^{28}\text{Si}, 4p)^{64}\text{Zn}$ reaction channel, a strongly coupled band was observed up to spin ≈ 20 at an excitation energy of ≈ 15 MeV.

Researchers G.C. Ball, A. Galindo-Uribarri, V.P. Janzen, D.C. Radford and D. Ward (*TASCC*)

Beam 115 MeV ^{28}Si

Duration 5 days

Experiment Measurement of the excitation function for the production of $^{146,147}\text{Gd}$ via the $^{51}\text{V} + ^{100}\text{Mo}$ reaction from $E=225-240$ MeV. This run also demonstrated that an adequate beam of vanadium-51 can be produced from a negative-ion sputter source; this is useful information in preparation for an upcoming GA.SP experiment.

Researchers A. Galindo-Uribarri, G.C. Ball, V.P. Janzen and D.C. Radford (*TASCC*)

Beams 225, 230, 235 MeV ^{51}V

Duration 1 day

Experiment Accurate measurement of differences in the Giant Dipole Resonance spectra that could be attributed to entrance-channel effects in fusion reactions. The 4π miniball array was used for charged-particle detection. One half of the BGO ball was withdrawn from the target by ≈ 1 m to measure accurately the shape of the high-energy γ -ray spectrum and discriminate against neutrons via time-of-flight.

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

Beams 4.2 MeV/A ^{76}Ge ; 156 MeV ^{30}Si

Duration 6 days

Experiment Measurement of the chlorine-36 content of approximately 100 samples and standards, including archived evergreen seeds from Canada, and lichen and soil samples from Chernobyl.

Researchers H.R. Andrews, W.G. Davies, B.F. Greiner, Y. Imahori, V.T. Koslowsky, J.W. McKay and J.C.D. Milton (*TASCC*); R.J.J. Cornett, L.A. Chant, G.M. Milton and E. Romaniszyn (*Environmental Research Branch, CRL*)

Beams 100 MeV $^{35,36,37}\text{Cl}$

Duration 6 days

Experiment Irradiation of inert-matrix candidates, cerium oxide and zirconium silicate; study of gas release from hyperstoichiometric UO_2 at room temperature.

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

Beam 72 MeV ^{127}I

Duration 2 days

"DON'T EVER SHRINK FROM THE BELIEF THAT YOU HAVE TO PROVE YOURSELF EVERY MINUTE, BECAUSE YOU DO."

SONNY ROLLINS, AMERICAN JAZZ MUSICIAN

Next month

- Study of sub-threshold pionic fusion
- AMS measurements of Cl-36 and I-127 in various samples
- Study of ridge structure of Os-178
- RCE measurements for Si
- Cyclotron beam development

Facility operating record

Elapsed Time (Year-to-date) 1368h

Beam Available	
Tandem Only	682.5
Tandem + Cyclotron	205
Beam Preparation	247
Beam Development	70
Planned Shutdown	109.5
Unplanned Shutdown	54

Editor: Larrie Thomson
Tandem Accelerator Superconducting Cyclotron
AECL Research, Chalk River Laboratories
Mail Station 49A, Chalk River,
Ontario, Canada K0J 1J0
Phone (613) 584-8811, extension 4131
FAX (613) 584-1800
Internet TASCC@CRL.AECL.CA



AECL EACL