

AMS ion source improved to reduce memory effects

Measurements of very low levels of chlorine-36 by accelerator mass spectrometry (AMS) at TASCC are no longer seriously affected by contamination left over from earlier samples with higher chlorine-36 levels. A modification to the sputter ion source has reduced this contamination by a factor of at least 10.

Memory effects have been effectively eliminated from the ion source following a study that indicated the contamination occurs in the region immediately

surrounding the sample. The solution is to operate this portion of the ion source above 350C.

There is a similar improvement of a factor of 10 in background and measurement dynamic range. The spectrometer background is now about 5×10^{-16} parts of the chlorine-36 isotope to one part total chlorine.

Techniques used in the study were radioactive tracer analysis and elastic-recoil-detection surface analysis.

Future work will apply these techniques to memory reduction in iodine-129 measurements.

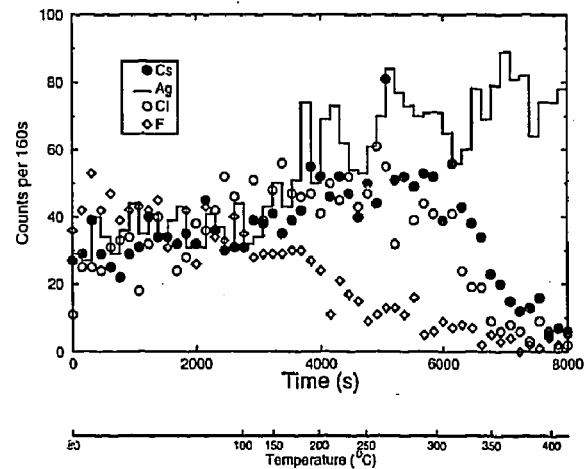
Facility report

Six sets of experiments were conducted this month, as described elsewhere in the newsletter.

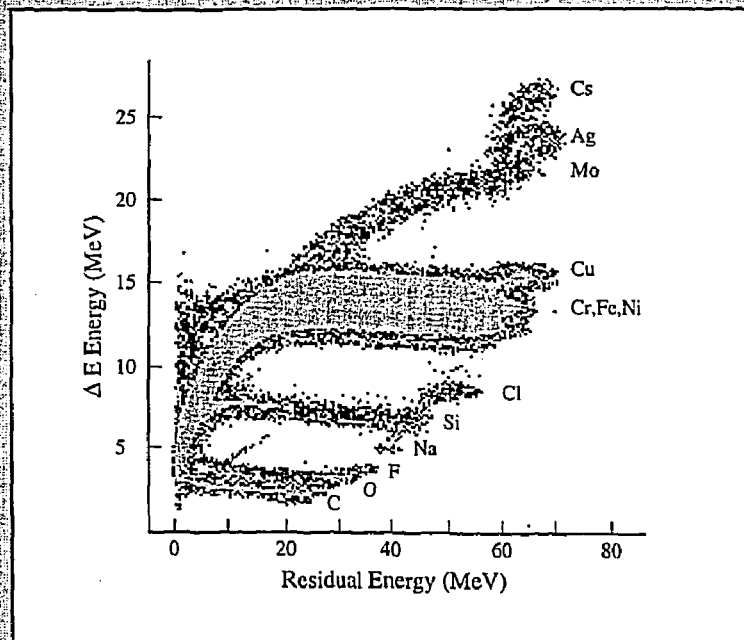
Two short power outages early in September caused loss of beam for about one hour, and further beamline vacuum problems delayed the beam for about five hours mid-month during an 8π spectrometer run.

Beams produced during August were:

Ion	Energy (MeV)
4He	3.1 & 7.6
^{18}O	65
^{27}Al	160
^{28}Si	145
^{49}Ti	220
^{79}Br	250
^{127}I	72 & 2413



Surface layers of cesium, chlorine and fluorine are desorbed by heating components in the AMS ion source chamber.



Elastic-recoil detection analysis of the AMS ion source reveals several different layers of elements present on stainless-steel components in the chamber.

News bits

- ◆ Alfredo Galindo-Uribarri is now a member of the TASC professional staff. He had been a nuclear physics research associate since joining the facility in 1991.
- ◆ Joe Gallant, a retired staff member of TASC, died in Deep River Hospital on August 6. Joe was one of the world's best target makers, and was a founding member of the International Nuclear Target Development Society in the early 1970s. He retired from TASC in 1985.
- ◆ Glen Backmeier, an electronics technologist with TASC since 1988, left AECL on August 9 and has moved to Ottawa to pursue his career there.
- ◆ A contract has been signed between TASC and DREO (Defence Research Establishment, Ottawa) and CSA (Canadian Space Agency) to add an "irradiation-in-air" capability to a general purpose SEE (single-event effect) facility under development at TASC. The work will be completed and its operation demonstrated to DREO before the end of this fiscal year.

August experiments

Experiment	Channeling studies using the $^4\text{He} + ^{16}\text{O}$ resonance at 7.6 MeV to look for evidence of structural changes in thin-film high- T_c superconducting crystals.
Researchers	J.S. Forster, G.C. Ball and J.S. Geiger (TASC); J.A. Davies and S.G. Wallace (McMaster University)
Beams	3.1 and 7.6 MeV ^4He
Duration	3 days

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Experiment Study of intruder bands in indium-115 produced in the $^{100}\text{Mo}(^{18}\text{O}, p2n)$ reaction with the 8π gamma-ray spectrometer.
Researchers U. Garg, B. Kharraja and S. Ghugre (*University of Notre Dame*); V.P. Janzen and A. Galindo-Uribarri (*TASCC*); R. Kaczarowski and E. Ruchowska (*SINS, Poland*); J. M. Sears and S. Gundel (*SUNY, Stony Brook*)
Beam 65 MeV ^{18}O
Duration 4 days

Experiment Search for exotic triaxial deformation in hafnium-164 produced in the $^{120}\text{Sn}(^{48}\text{Ti}, 4n)$ reaction with the 8π spectrometer.
Researchers J.N. Wilson, S. Flibotte and J.C. Waddington (*McMaster University*); A. Galindo-Uribarri, G.C. Ball and D. Ward (*TASCC*); C. Rigollet (*CRNS, Strasbourg*)
Beam 220 MeV ^{48}Ti
Duration 4 days

Experiment Investigations of ridge structures in tantalum-171,172 populated in the $^{150}\text{Nd}(^{27}\text{Al}, xn)$ reaction and in tungsten-173,174 via the $^{150}\text{Nd}(^{28}\text{Si}, xn)$ reaction with the 8π spectrometer. These experiments are a continuation of a systematic study of collectivity at high spin in this mass region.
Researchers M. Cromaz, J. DeGraaf and T.E. Drake (*University of Toronto*); S. Flibotte and S.M. Mullins (*McMaster University*); A. Galindo-Uribarri, V.P. Janzen and D. Ward (*TASCC*)
Beams 160 MeV ^{27}Al ; 145 MeV ^{28}Si
Duration 5 days

Experiment Simulation of fission-fragment damage at several temperatures in candidate inert matrices for plutonium burning in CANDU[®] power reactors. Radiation damage will be assayed by laser profilometry, X-ray diffraction and electron microscopy.
Researchers R.A. Verrall and P.G. Lucuta (*Fuel Materials Branch, CRL*); H.R. Andrews (*TASCC*)
Beam 72 MeV ^{127}I
Duration 2 days

Experiment Set up for commercial irradiation of foils; tests of position-sensitive photomultiplier and transmission counter for future SEE (single-event effects) studies.
Researchers H.R. Andrews (*TASCC*)
Beam 19 AMeV ^{127}I ; 250 MeV ^{79}Br
Duration 1 day

IF YOU'RE TO MEET YOUR GOAL, YOU MUST BE ABLE TO EMULATE THE CONFIDENCE OF THE
LITTLE GIRL WHO TOLD HER TEACHER SHE WAS DRAWING A PICTURE OF GOD.
WHEN THE TEACHER SAID: "BUT NOBODY KNOWS WHAT GOD LOOKS LIKE,"
THE LITTLE GIRL REPLIED: "THEY WILL WHEN I GET THROUGH."

Next month

- Search for superdeformation in terbium
- Laser tests of Canadian Penning trap mass spectrometer
- Study of Coulomb excitation in neodymium-148
- Measurement of branching ratio of sodium-21
- Studies of shell-closure effect in $N=Z=28$
- Tests of new accelerator mass spectrometry source
- Materials analysis with ERDA (elastic recoil detection analysis)
- Radiolysis of reactor water samples

Facility operating record

Elapsed Time (Year-to-date) 5736 h

Beam Available	
Tandem Only	2483.5
Tandem + Cyclotron	998.5
Beam Preparation	843.5
Beam Development	428.5
Planned Shutdown	537.5
Unplanned Shutdown	444.5

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