

## Summer programs bring researchers and students

Fresh faces abound at TASCC as the summer season brings visiting scientists and students to participate in our research programs. In addition to the steady stream of researchers here for scheduled experiments, these attached-staff visitors come for extended periods of up to several months.

Finn Ingebrøtzen from the University of Oslo in Norway is spending two months collaborating with the  $8\pi$ -spectrometer group to study high-spin states in rhenium-169. Finn also presented a well-received talk called "A Pedestrian View of the Laws of Thermodynamics in Energy Use".

Another visitor with the  $8\pi$  group was Ingemar Ragnarsson from the Lund Institute of Technology in Sweden. He has been providing theoretical support for studies of superdeformation in gadolinium isotopes as part of a comprehensive paper being prepared on the subject. He also explored the theoretical basis for the possible existence of hyperdeformation in chromium-48 and nearby nuclei. In addition, Ingemar presented a colloquium titled "The Role of Low- and High-j Orbitals in Superdeformation".

Jean-Francois Lecolley from the Laboratoire de Physique Corpusculaire of the Université de Caen in France usually focusses on multifragmentation and meson production in heavy-ion collisions at GANIL. At TASCC however he is spending three months with the particle-reactions group simulating the dynamics of projectile-breakup processes. Jean-Francois presented a talk with the title "Subthreshold Pion and Kaon Production in Heavy-Ion Collisions".

From the University of Manitoba come two visitors to the ISOL group. Kumar Sharma and graduate student Phil Unger are here for the month of August to study masses of exotic nuclei. Phil will remain at TASCC to complete the measurements and analysis required to determine the masses of some isotopes of cadmium, antimony and iodine near the doubly-magic  $N=Z=50$  region.

As usual, Canadian university students are employed to assist TASCC staff members in various projects. Four summer students are working at TASCC this year.

Paul Unrau from McMaster U. is working with the  $8\pi$  group and is analyzing data on high-spin states in thulium-159.

Guy Sheldon from Saskatchewan is helping the particle facility group build a third ring of detectors for the Forward Array and is analyzing data from heavy-ion collisions.

Steve Swickis, a cooperative-program student from Waterloo U. is involved with ISOL studies of isospin-forbidden transitions and their effect on superallowed decay rates, particularly those of manganese-50.

Lowel Winger, another cooperative-program student from Waterloo U. is helping the cyclotron group design and build a module to improve control of the r.f. system.

Visitors here for the summer months always find time for involvement in extra activities, which this season included forming an *a capella* singing group that performed at the company picnic, entering the local triathlon, joining summer sports teams, as well as the usual hiking, camping, canoeing and river activities.

## Facility report

Scheduled experiments this month included three cyclotron runs, a particle-detector calibration, chlorine-36 dating by AMS, and an  $8\pi$ -spectrometer study of hafnium hyperdeformation.

The superconducting cyclotron was operated for three separate runs, one of which confirmed that no change in magnet-coil behaviour had occurred during last month's partial cryostat warmup.

Other cyclotron runs produced high-energy chlorine for detector calibrations and the first extraction of 40 MeV-per-nucleon nitrogen. This latter beam required the highest r.f. power level to date.

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## Facility report cont'd

The Tandem tank was opened three times: the first time to repair a terminal steerer power supply; the second to repair spark damage to an inductor lead in the charging system and the third to retighten an inductor set-screw.

Beams produced by the Tandem included: 36 MeV nitrogen-14; 140 MeV silicon-28; 17.4 to 163 MeV chlorine-35, 100 MeV chlorine-36 and 100 & 205 MeV chlorine-37.

## Forbidden beta-decay branch stronger than predicted

The ISOL group has determined the branching ratio of an isospin-forbidden beta-decay branch from vanadium-46 to be 50 ppm of the superallowed ground-state branch. This is stronger than predicted by two models of nuclear charge dependence.

Our results may therefore lead to a change in the treatment of corrections necessary to deduce the weak vector coupling constant and could have a profound effect in resolving discrepancies among several methods of determining this fundamental quantity.

## July Experiments

<b>Experiment</b>	: Chlorine-36 dating of ground water by AMS
<b>Researchers</b>	: H.R. Andrews, V.T. Koslowsky, W.G. Davies, Y. Imahori and J.W. McKay ( <i>TASCC</i> ) with R.R.J. Cornett ( <i>Radiation Biology Branch</i> )
<b>Beams</b>	: 100 MeV $^{36,37}\text{Cl}^{+7}$
<b>Duration</b>	: 5 days
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<b>Experiment</b>	: Study of hyperdeformation states in hafnium-168 with the $8\pi$ -spectrometer
<b>Researchers</b>	: T.E. Drake, G. Zwartz and M. Cromaz ( <i>U of Toronto</i> ), A. Galindo-Uribarri, D. Ward, G.C. Ball, H.R. Andrews and D.C. Radford ( <i>TASCC</i> ), V.P. Janzen ( <i>TASCC/McMaster U</i> )
<b>Beam</b>	: 205 MeV $^{37}\text{Cl}^{+15}$
<b>Duration</b>	: 5 days
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<b>Experiment</b>	: Test of superconducting cyclotron magnet with 8.5 MeV-per-nucleon chlorine-35, production of 35 MeV-per-nucleon chlorine-35 and first extraction of 40 MeV-per-nucleon nitrogen-14
<b>Researchers</b>	: TASCC Beam Commissioning Team
<b>Beams</b>	: 8.5 MeV/u $^{35}\text{Cl}^{+13}$ , 35 MeV/u $^{35}\text{Cl}^{+13}$ and 40 MeV/u $^{14}\text{N}^{+6}$
<b>Duration</b>	: 7 days
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<b>Experiment</b>	: Test of particle chamber detectors with high-energy chlorine-35
<b>Researchers</b>	: D. Horn, E. Hagberg, G.C. Ball, A. Galindo-Uribarri, M.G. Steer and T.G. Whan
<b>Beam</b>	: 35 MeV/u $^{35}\text{Cl}^{+13}$
<b>Duration</b>	: 3 days
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<b>Experiment</b>	: Study of high-spin states in rhenium-169 and gold-181 with the $8\pi$ -spectrometer
<b>Researchers</b>	: S. Pilotte and C.-H. Yu ( <i>U. of Tennessee</i> ), J.C. Waddington, S. Mullins, J. Rodriguez and D. Prevost ( <i>McMaster U.</i> ), D. Ward, D.C. Radford, A. Galindo-Uribarri, G.C. Ball and H.R. Andrews ( <i>TASCC</i> ) with F. Ingebretsen ( <i>U. of Oslo</i> )
<b>Beams</b>	: 140 MeV $^{28}\text{Si}^{+9}$ and 157 to 163 MeV $^{35}\text{Cl}^{+11}$
<b>Duration</b>	: 6 days

## Next month.....

- Hyperdeformation studies of hafnium-168
- *ISOL study of production rates of light nuclides*
- Particle reactions study with high-energy nitrogen
- Implantation of erbium in National Research Council samples
- Superdeformation studies in lead isotopes

## Facility operating record

Elapsed Time (Year-to-date) 5183 h

	<b>Tandem</b>	<b>Cyclotron</b>
Beam Available	3501.3	442.7
Beam Development	755.3	976.8
Scheduled Shutdown	648.3	3598.9
Unscheduled Shutdown	278.1	164.6

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