

Notes from ISAC Forum of July 20, 2005

1. E989  $^{26}\text{Al}(\text{p},\text{g})^{27}\text{Si}$  [Anuj Parikh]

Since the previous report by Chris Ruiz on July 6 there were another 5 days of scheduled beam to E989, interrupted for 1 shift for ISAC-2 commissioning and  $^{22}\text{Na}$  implantation. The beam energy was lowered from 201 keV/u to 198 keV/u because earlier running indicated resonance capture was taking place about 3 cm downstream of the centre of the gas target cell.

In the final running at 198 keV/u two-ish more capture events were identified. The total beam delivery for the entire run was about  $3 \times 10^{14}$  ions at the DRAGON target. The great boost in beam current from laser ionization was again highlighted in a display of beam current vs time.

A beam request to get better statistics at 198 keV/u and to do an off-resonance run has been submitted for the fall schedule, as well as a request for Si beam to measure charge state distributions.

Alan Shotter: what lessons had been drawn from the unhappy experience of poor support from the laser manufacturer?

Paul Schmor: we will become more independent and redundant -- better able to make repairs ourselves and get subcomponents directly from their source. The budget allocation has been adjusted and the goal is to have a second laser ready for use by November, and thereby to have working two lasers on site.

Matt Pearson: the failed Lambda power supply has been declared irrecoverably dead, following examination on the bench by Electronics.

2. E1027  $^{22}\text{Na}$  implanation [Jac Caggiano]

The collection apparatus shown at the July 6 forum was used in a run on July 7th, in parallel with the ISAC-2 cavity test. The yield of  $^{22}\text{Na}$  (using proton beam) was about 5 times lower than was observed in May from the previous SiC target. The reason for this is not understood.

Transmission of  $^{23}\text{Na}$  and  $^{22}\text{Na}$  was good up to the last Faraday cup in front of the Collection Station, but not from there to the C.S. Activity was measured subsequently on skimmer plates and the LN<sub>2</sub>-cooled shroud which were between the Faraday cup and the collection foils. Because of the transmission problem, implantation was done only at 10 uCi and not also at the planned two targets of 200 uCi.

Three shifts have been requested for the fall schedule, to study the transmission problem and do the implantations of higher-activity targets.

3. E1031  $^{12}\text{C} + ^{12}\text{C}$  [Alison Laird]

First few shifts of beam were spent sorting out a problem with the new all-VME ADC/TDC system. ADC data and TDC data were each correct, but were not being properly synchronised. The problem was in one of the options specified for TDC setup.

A serious problem has appeared at the high beam intensities ( $10^{11}$ ) of this experiment: the LEDA detectors showed rapid, beam-related increase in leakage currents. The problem is thought to be charge build-up in various non-conducting surfaces on or near the detectors. Various measures such as applying bias voltage to the target or to shields in front of the detectors have provided only limited improvement. Experience at Yale with similar detectors and intense beams was that many steps had to be taken to avoid such problems: magnetic field at the target, biased shrouds, back-to-front orientation of the detectors.

The low-beta buncher appears to be providing a good time-focus at the HEBT3 fast Faraday cup, but the required r.f. power is only 100 W instead of the expected 3 kW. Initial measurements with TUDA detectors gave a 10-ns width in the timing peak, but more recent observations in upstream detectors gave 3 ns.

4. E920 Collinear laser spectroscopy [Fritz Buchinger]

The goal of the experiment is to measure the change in rms radius between isotopes of La. This is done by observing the shift in frequency of an atomic transition, using the Polarizer line: La ion beam velocity is modulated by a small accel-decel section to provide Doppler tuning with respect to a collinear laser beam. The laser frequency is chosen to excite from an (atomic) isomeric level up to a level which decays to the

ground state, emitting light which is of shorter wavelength than the scattered laser light. The decay photons are detected by a PM tube which views a field-free region in the middle of the accel-decel section.

Detection sensitivity was measured with a 2 nA beam of stable  $^{139}\text{La}$  from the OLIS microwave source -- the question is whether the experiment is sufficiently sensitive to 1 pA from the surface ionization source which will supply radioactive La isotopes. Various steps have been taken to reduce background from scattered light and gamma radiation from the nearby Faraday cup; these improvements should result in a 1:5 signal-to-noise ratio for a 1 pA beam, which will make the measurement possible in a reasonable time.

The fraction of beam coming from the surface source in the atomic isomeric state may depend on factors (e.g. work functions) in addition to the Boltzmann factor. The estimate is that of order 1% of the La ions are in the isomeric state. Another multiplicative factor is the yield of La isotopes from the Ta production target; an estimate comes from the observation during the August 2004 run that the production rate for  $^{134}\text{Pr}$  was  $(1-5)\times 10^6$ .

Laser locking with an I cell was achieved at the McGill lab. (The required overall accuracy is about  $\pm 20$  MHz.)

#### 5. TIGRESS [Greg Hackman]

The plan is to use a fusion-evaporation reaction plus detection of protons in a Si counter to provide a source of tagged gamma rays to test position resolution at the sub-module level.

At the moment there are DAQ problems (inter-board communication) but if they are sorted out the test will be carried out using the prototype detector. The second production unit is undergoing bench testing -- it shows sensitivity to microphonics, although not as severely as in the first production unit (which has been returned to the manufacturer).

#### 6. Other [Dave Hutcheon]

The deadline for submission of beam requests for the Fall '05 schedule is July 22nd.

A Technical review of the Beta NQR platform is to take place this afternoon.