NMR NEWS

JEOL June 24th (pg.3) | Mark Wins Award! (pg.2) | 700 Metabolomics (pg.2)

PANIC NMR Conference - Houston Tx.

Practical Applications of NMR in Industry Conference As with all things NMR, it's the acronym that counts. See pg. 3 for details about the conference.

South NMR Display

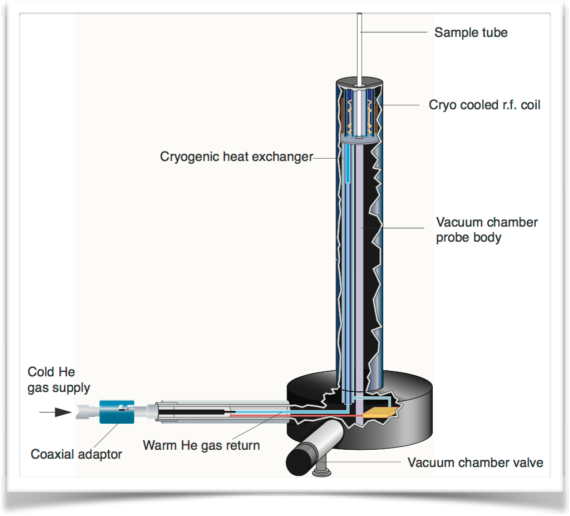
The south NMR is about to be updated. We're looking for ideas to add. See page 4 for more.

SOP for Magnet Decomissioning

After checking with the international community, surprisingly there was no safe operating procedure for decommissioning a superconducting magnet, until now. See page 4 for details

Picking up after the robots

A reminder that with robotic sample handling now on 3 instruments please don't forget to retrieve your samples when done.



Cold Probe Maintenance

Each NMR cold probe has a compressor that supplies the cooled (*i.e.* < 20K) helium gas to the probe itself. The piston inside the compressor, commonly called a "cold-head", has a 10,000 hour recommended run time before needing refurbishment. An updated service quote from our vendor has sky rocketed in price due to exchange and increases in service charges. In response, we will be performing this service in-house using parts from the original equipment manufacturer (Sumitomo Inc.). Down time (~3 days) will be kept to a minimum, and the cost will be substantially less than the quoted commercial rate. This should help protect users fees. The first system was the v700, addressed in mid to late May. We will do our best to inform users in advance so they can plan. The u500 will follow in a few months. See the "700 Metabolomics" article later on for details regarding cost recovery used for the cold heads.

Metabolomics and v700 Robotics Usage

The new Agilent 7620 sample handing robot means that multiple over night and/or weekend experiments can be queued up without users having to be present. Notifications and status updates for users are handled identically to the other systems (*i.e.* m400 and u500 spectrometers) via email. Special thanks to Mark for setting up everything with a consistent user interface.

This improved capability opens up a substantial amount of newly practical spectrometer time. One of the potential users for this capacity is the high throughput field of metabolomics. NMR is one of two major techniques (the other being mass spectrometry) used to determine the chemical metabolic content of various samples. These samples are most often bio-fluids and for humans the most commonly utilized samples are urea and plasma. The ease of collection is an obvious advantage hence the strong interest as opposed to more difficult prospects that have been published (like cerebral spinal or ocular fluid).

Metabolomics requires exceedingly stable spectrometers/environments and a substantial amount of spectrometer time to run up to hundreds thousands of samples in a single project. For example the proposed UofA Hepatitis studies are considering hundreds of thousands of human samples just to establish reliable baselines, let alone the actual viral samples.

For chemistry users, the impact will be negligible with metabolomics users preferring overnight runs a few times a week. We will make every effort to inform researchers of reserved time for metabolomics and/or long biomolecular NMR experiments, so please check the NMR schedule page for availability and planning of longer experiments.

Sample positions 49-73 (*i.e.* back right spots) have been reserved for metabolomics samples to minimize the chance of a user accidentally breaking a tube while inserting or removing one of their own samples. Users are reminded not to touch these samples and report any tube breakage to Ryan and/or the other NMR staff right away for immediate clean up. While the chance biological risk of these samples is very small, we don't want to take any chances.

Mark Wins Much Deserved Award !

The NMR Facility is proud to announce that Mark Miskolzie has received the Sigma XI Research Society's "Outstanding Technician of the Year" award for 2016. The competition this year was very tight with each of the judges only able to recommend two finalists from the entire nomination pool. While the judges often had different sets of finalists, Mark was consistently one of the two, making his nomination the undisputed choice. The award is named for Dr. Nat Rutter who recognized the need for a way to properly acknowledge the hard work and dedication of our many fantastic staff members. The final decision was announced last month, and the picture (see inset) shows Mark receiving the award from Dr. William Tonn. Dr. Rutter was also there. Please congratulate Mark the next time you get a chance.

5th Annual Practical Applications of NMR in Industry Conference PANIC
SONESTA RESORT HILTON HEAD ISLAND • HILTON HEAD ISLAND, SC
FEBRUARY 20-23, 2017

Conference Update

With the financial pressures we've all been experiencing, the NMR facility has stepped up actively seeking additional outside usage for any spare NMR time. The acquisition of the robotic sample handling system for the v700 spectrometer has made available (and convenient) submission of automatic overnight samples. This means we can more efficiently sell any spare time during the evenings (see 700 Metabolomics article for more details). Unfortunately the same pressures encouraging us to seek outside usage has decreased the available funds from those outside groups, not to mention other facilities seeking the same external usage and support.

The 2016 **P**ractical **A**pplications of **N**MR in **I**ndustry **C**onference (PANIC) was held in Houston during February. The purpose of the conference was to explore what academic researchers can do regarding participation in commercial projects, and see where expected demand from industry will be going.

A major recent push is for relatively low field instruments with variable magnetic field capabilities. The growing field of "relaxometry" was very well represented with three companies showing instruments. Some great presentations detailed the advantages and weaknesses of the experiments. In addition to variable field, non-cryogen magnets were popular with several companies offering models using ultra-cold gasses, or pumped evacuated superconducting coils. Cryogen free rare earth magnets were also plentiful.

Recent and proposed industrial applications of NMR were presented during the conference and it was great to see how other groups are attempting to overcome the same challenges we've been experiencing with our industrial clients. One of the most impressive developments was an NMR probe at the head of an oil well drill bit. The system was able to determine the content of coolant drilling fluids pumped through the drill head. Real time data was acquired about the surround soil composition as they penetrated different soil layers. In one case they found an additional resource deposit above the target site that was not visible by other techniques. Without the real time data they would have never known to extract anything at the additional depth.

Save the Date -> JEOL is Coming - June 24th @ 2pm Room E3-25

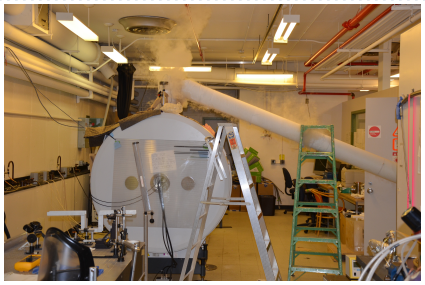
As many of you will remember, Agilent exited the NMR market in late Oct. - 2014 leaving one primary vendor (Bruker Inc.). Agilent had purchased the original NMR vendor Varian back in 2010. This had a very real potential impact on our resources as our liquids NMR systems are all Varian/Agilent vintage. The same share-holder directed market pressures that forced Agilent to leave the NMR business still exists for the other vendors. Bruker has very publicly stated that they intend to remain in the NMR market, but options and competition are always healthy. Presently Bruker has a vast dominant market share, but JEOL (associated with Japan Steel Inc.) is another company that has been selling NMR spectrometers for more than 60 years. JEOL has offered to send representatives and we have finalizing a date with the company and our investigators. JEOL will be able to show us their latest developments and present options for upgrading our existing spectrometers, while utilizing the most number of parts minimizing costs.

JEOL Solutions for Innovation

South NMR Display

The Varian A60 in the main hall of the East Chemistry building (south end) has been updated for lighting and power. We will be adding a monitor displaying "did you know" information about NMR, cryogens, and a welcoming to the Chemistry Buildings. We were thinking additional slides highlighting each professor's recent work would also be interesting to potential students and visitors. We'll be approaching researchers for key points later. If you have ideas about useful/fun/interesting information that we'd like students and visitors to read when entering from CAB please let Ryan know.

SOP for Magnet Decommissioning

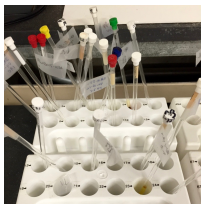


A 9.4 T horizontal bore magnet was decommissioned in the department back in September of last year. The magnet contained approximately 570 L of liquid helium (~400,000 L of gas). The Machine Shop and NMR facility devised a safe and cost effective way to move the resulting helium gas out of the sub-basement to the service access shaft nearby. As part of this endeavour, a Safe Operating Procedure (SOP) was developed to assist future events, and external users. This document has been submitted to the Association of Manager in Magnetic Resonance Laboratories (AMMRL) for further contributions and changes. A detailed video is also available for anyone interested. Please contact Ryan if you'd like to see either file.

Reminder about Training and Safety Requirements

The NMR facility is checking to see that researchers and students have their up-to-date WHMIS training as per departmental requirements. We also strongly recommend that anyone handling samples for NMR analysis also have completed the UofA Environmental Health and Safety (EHS) Chemical, and Laboratory online training courses. These courses are available on the EHS website (http://www.ehs.ualberta.ca) on the title page (see inset). Both courses take an hour or two and have quizzes at the end with a limited number of trials.

Don't forget samples on the robots



Now that we have the convenience of robotic sample handling and queued submission on 3 instruments, please remember to pick up your samples. The available reserve storage spots fill up quickly and valuable samples can get lost. Even disposable samples need to be recovered, and hopefully the same or next day after acquisition.

Please treat these robots like the valuable and hard to replace units. Many thanks to those taking good care of them.