

## Director's Corner

Welcome to the inaugural edition of the AFRD Newsletter! Why a newsletter? Our primary means of communicating is through conferences, publications and reviews respectively. We do well through these channels but there are other opportunities and other audiences we can effectively engage. One example is increasing the communication between programs within our own Division! Cross-fertilization of ideas occurs all too infrequently, yet I am convinced that there is a huge untapped potential here. The reasons why this doesn't happen are understandable; we are geographically spread out, so it is difficult to just drop into someone's office, it is difficult to get everyone in the same place at the same time, and everyone is simply very busy with their own work.

Other nearby communities we are woefully out of touch with are the other scientific divisions at LBNL. We build tools for applications and they provide applications for our tools. Good communication is critical for our future success.

My intent is to use the newsletter to keep our partners at the funding agencies informed of our latest ideas and accomplishments. There are also our colleagues at other institutions. The creative and diverse program in AFRD can benefit a much broader community. Finally, there is the general public; the folks who pay our salaries and support our work. We can do a much better job of connecting with them. Appreciation follows understanding. These are perhaps overly ambitious goals for a simple newsletter, but let's give it a try.

So, why now? There is no good answer to that one. It's been a good idea for a long time but never quite got off the ground. I have asked Peter Seidl, Joe Chew, and Ina Reichel to take the lead in making this happen. It seems to be working. Ina has been on my case to get this written for quite a while. Thank you Ina!

Our initial intent is to publish once a month, but, in order for this experiment to be a success, we need your contributions and ideas.

Steve

## Acoustic emission diagnostics of the superconducting magnets

When superconducting magnets quench unexpectedly, it is often hard to understand the reasons and to identify physical mechanisms responsible for performance limitations. Traditional diagnostics focusing on coil voltages and field transients are not always sufficient. Surprisingly, one can learn a lot about magnet's internal state by listening to the sounds it emits during operation. A simple piezoelectric microphone attached to the coil structure is sufficient to reveal the complex magnet acoustics. The Superconducting Magnet Group has developed an acoustic quench diagnostic system which has been recently installed and tested on two superconducting magnets.

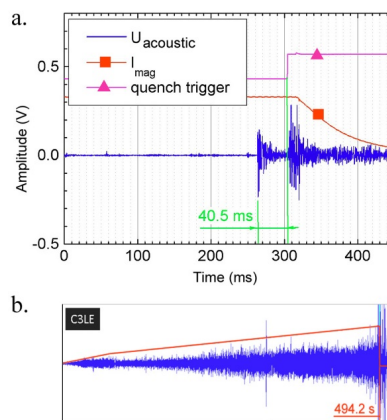
Evidence of the acoustic precursor to quenching was observed, as well as localization of the quench initiation and associated mechanical events.

The acoustic diagnostics is non-intrusive, immune to magnetic fields and relies on inexpensive sensors that are easily adaptable to various magnet configurations. More tests are currently underway.

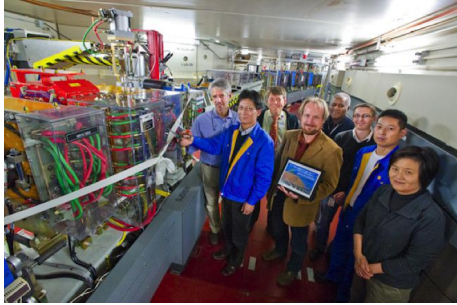
## ALS Sextupole Upgrade Completed Successfully

The ALS is 20 years old this year. Over this time it has seen a number of upgrades and changes, the latest one having recently been completed. New lattices were studied to increase the brightness. The most promising lattices however were beyond the capabilities of the existing sextupole magnets.

The installation of the new magnets, which were built at SINAP, started late in 2012 during short maintenance shutdowns, with 13 of the new sextupoles being installed ahead of time. The remainder of the 48 magnets were installed during the 2013 spring shutdown. Migration to the new lattices was quick (a few



hours), after verifying all magnet polarities and magnet transfer functions in a beam based way in the old lattice.



Optimizing photon beamlines progressed quickly and users were able to resolve the brightness increase. All machine parameters, e.g. dynamic aperture, Toucheck lifetime, behaved as expected.

With the completion of this upgrade the horizontal emittance of the ALS was reduced from 6.3 to 2.0 nm. This resulted in a brightness increase by a factor of three for bend magnet beamlines and at least a factor of two for insertion device beamlines. The ALS now has one of the smallest horizontal emittance of all operating 3rd generation light sources. Initial user operation has been very successful. Most beamlines have been able to benefit significantly

from the upgrade. No interruptions during the first months of user operations were related to the upgrade.

## Get to Know Your Colleague: Steve Gourlay

**What is your current position and what are you working on right now?**

Director of the Accelerator and Fusion Research Division for the last 7 years.

**Have you done other things at the Lab prior to your current activities?**

Before my current job I was head of the Superconducting Magnet Program

**What is your professional background? Where have you worked before coming to the Lab?**

I was originally trained as an experimentalist in Particle Physics. I spent the first 16 years of my career at Fermilab and a year as Scientific Associate at CERN before coming to LBNL.

**Where are you from originally? Where did you go to college or university?**

I was born and raised in Kansas. My dog was not named Toto. Not quite a farm boy but I did work for some farmers. I started out in Nuclear Physics but switched to Particle Physics when one of my professors asked if I wanted to spend the summer at Fermilab.

**Ever had something go spectacularly wrong?**

As a kid, I was always trying to blow things up. I was about 10 and working on a fresh batch of gunpowder in a little lab that my grandmother let me set up in the corner of her art studio and was "testing" it by lighting a bit off to the side. I can still see the tiny spark arc through the air and land in the mortar full of fresh powder. A column of flame shot up, the heat cracked the mortar and burned through the table. Fortunately there was no significant damage (just my table) and more importantly, no one found out!

**With which scientist (past or present) would you like to discuss their work?**

Feynman. His intuitive grasp of physics was incredible. I'd like to play drums with him too!

**What's on your MP3 player? What did you last listen to?**

It's a eclectic mix, from classical to hard rock and everything in between. Right now I like Pink and Katy Perry. Yeah, I know. . . but it's good commute music.

**Anything else you would like to share?**

I have often heard, "I'm sorry to bother you . . ." from people in the Division. Please do "bother" me. It's my job, and if there is a problem, I need to know so we have at least a chance of solving it.



## Link of the Month: Moebius Maglev Train

You might have seen the maglev train that the Superconducting Magnet Group built a few years ago. But how about this: Someone built one where the track is actually a Moebius strip. Links to a video and some explanation of the science behind it can be found here: <http://tinyurl.com/lp4dvv7>

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Thanks to Soren Prestemon, Maxim Martchevskii, and Christoph Steier for news items, Joe Chew for suggesting the link and Steve Gourlay for agreeing to be the guinea-pig for "Get to Know Your Colleague".

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Please send suggestions for news items, links or "get to know your colleague" to Ina Reichel ([IReichel@lbl.gov](mailto:IReichel@lbl.gov)).