EMR Director Stephen Hill

BY AMY MAST

Though Stephen Hill was only recently hired to lead the Magnet Lab's Electron Magnetic Resonance (EMR) program, his relationship with the place dates back to the lab's earliest days. Below, Hill, originally from outside Oxford, England, talks about the path to a career in science and how he ended up at the helm of a program that had helped to shape his own career.

Steve Hill in front of the lab's 45 Tesla hybrid magnet *Photo by Ryals Lee*

How did your relationship with science begin?

I grew up six miles outside of Oxford. My village would come to be the place where **Oxford Instruments**, a company that has such an influence here at the Magnet Lab, started out.

At that time, the English educational system narrowed your focus of study at a very early age. I guess I was drawn to math and science long before I thought about a career path very seriously. For one, I wasn't bad at science, and my father was a chemistry lecturer, so I was exposed to conversations about science from an early age. When I was a kid he would set up the kind of cool experiments you often see here at the Magnet Lab Open House for my birthday parties.

I went to a very unusual elementary school where the curriculum essentially allowed the students do what they wanted for a large part of the day. I think this system suited my natural curiosity, but maybe it was not ideal for everyone. Once I got to secondary school I did well in the sciences, and the system was structured so that students moved into areas where they showed interest and aptitude. Probably by the time I was 14 I had a structured course load doing mainly math and science and almost no arts or languages. By the time I was 16, this was reduced it to just math, physics and chemistry. All of my science teachers were absolutely fantastic.

So by the time you got to college, you knew you would be a scientist?

At university, there were no electives -- I studied only physics. There are a lot of similarities between the U.S. and the U.K., but education is very different. It has its advantages because I was pretty much done with my Ph.D. by the age of 25, but I'll be honest and say I don't think I had the most well-rounded education.

I was very comfortable on the science track and I never had any doubts about following this path. I think the only choice I needed to make during my education was between chemistry and physics. My father was a chemist but my parents never pushed me in any specific direction except to encourage me to pursue the things I was curious about. I was pretty self-motivated and I think they understood that this was all I needed.

I actually struggled initially with chemistry, while physics came surprisingly naturally, so it was more natural to do something I was good at. But chemistry has actually crept back into my life as my career has progressed.

It really was amazing to me when I came to the States to see how the university system operates here. We had just one week of exams after three years of study, with no second tries. Nobody checked to see if we learned the material in a particular course. The first few years at university, I'm not sure if I was a terribly good student. I had the luxury of enjoying myself a bit too much — at least for the first year and a half. I had a fantastic time playing several sports and socializing. I buckled down after that.

So did you always plan on getting your doctorate?

Obviously, my father had a Ph.D., so I knew it was an option down the road. In the later years of my undergraduate career I got an internship to work summers with a company. It was nice to be doing something different, but when they offered me a job at the end, I didn't accept it.

In my final year of undergrad we had to narrow down even more to a subfield of physics. My tutor happened to be **John Singleton**, who is, of course, now a part of the Mag Lab. He was at Oxford at the time, and once a week we would meet and I would learn **condensed matter physics** from him. I remember John being very serious and very tough, but extremely good and very clear at what he was teaching. Through these tutorials and self learning I gained probably 90 percent of the knowledge that I took away from undergrad. John was extraordinarily hardworking, and I suppose in some sense a bit intimidating -- probably how my students look at me nowadays.

By the end of my degree he offered me a spot as his graduate student, and we just continued without a break.

I think that my relationship with my grad students is similar to mine with John. I try to push them to do their best. With John, he never had to say anything, but you knew that he expected a lot of you.

What happened once your doctorate was complete?

My research for my Ph.D. was heavily rooted in high magnetic field research and I was using magnets at the Nijmegen Magnet Lab in the Netherlands. I also attended conferences relevant to high magnetic fields. I got to meet **Jim Brooks** *[currently the director of the Mag Lab's Condensed Matter Science- Experimental group]* at a conference in Korea in my last year, and he offered me a **postdoc**. It just fell into my lap, and it sounded very exciting. I had no plans to move to the U.S., and I had never been to Tallahassee, but I came here in 1995 and loved it, and I spent two and a half years here with Brooks.

That would have been just after lab opened?

I was probably in with the first group of postdocs who got to be here with the place up and running. Those who came here at that time all ended up doing well. There was so much more space back then.

The biggest thing for me was the fact that even though there was already a **user** community, it was fairly small, so getting magnet time was really easy. We'd constantly get emails saying that such-and-such a ➔

KEY TERMS:

➤ ***Oxford Instruments:***
An England-based company that is a major supplier of, among many other scientific products, research magnets.

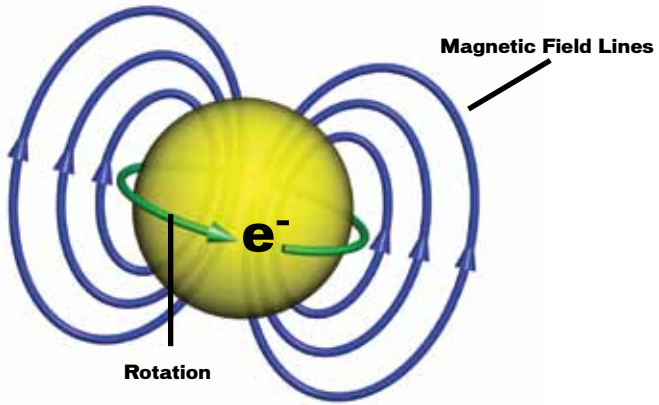
➤ ***John Singleton:***
Singleton is a staff member and Los Alamos National Labs Fellow at the Magnet Lab's Pulsed Field Facility in Los Alamos, New Mexico, and a longtime member of the Magnet Lab community.

➤ ***Condensed Matter Physics:***
The exploration of the properties of solid matter.

➤ ***Jim Brooks:***
Brooks is the director of the Magnet Lab's Condensed Matter Physics-Experimental group and a longtime member of the Magnet Lab community.

➤ ***Postdoc:***
Often a scientist's first full-time position after receiving a doctorate, postdocs work in the lab of a senior researcher. Some postdocs go on to their own faculty positions and others become full-time researchers.

➤ ***User:***
A scientist who visits the lab to conduct research. Providing space, time for magnet experiments, and equipment for user science is at the core of the Mag Lab's mission.



Electrons, which are like tiny magnets, are the targets of EMR researchers.

magnet was available, does anyone want it. The mentality in Brooks' group was that if any magnet time was available, we should be using it. I can easily imagine that somebody in his group was using a magnet close to half the time. Now we are lucky to get magnet time for a few weeks out of a year.

No lab can suddenly go from no users to a saturated program of users overnight. We were lucky to be here at that time. We were just churning out phenomenal data, and the magnets were bigger and better than anything that had come before by a significant margin in terms of field. We were looking at lots of things for the first time and I was able to publish a lot of what I found.

Where did you decide to go next?

I was only about 27 and I had done my two-year postdoc here. Brooks suggested that it would be a good idea for me to start applying for faculty positions. It was possibly a bit early in the game. I'd published a fair amount, but a lot of things weren't in print yet.

I got an offer from Montana State University and that was the one time that I wasn't completely sure what to do. This was across the country, a small school, and I didn't know much about the physics there. It turned out that they had great physics. I decided to go; Brooks and also Bob Schrieffer convinced me that I was much better off taking this opportunity because I would have a chance to show what I could do on my own. So I went, and it worked out really well.

EMR

About Electron Magnetic Resonance Science

EMR is the study of how electrons behave in molecules and solid matter. In an atom, electrons have a negative charge, and when a charged object spins, it produces magnetism. In other words, a spinning electron behaves like a tiny magnet. Indeed, this is the origin of magnetism, with the electron representing the fundamental magnetic particle. EMR scientists can study electrons, among other reasons, to learn about the properties of magnetism itself. This is of huge technological importance, given the significant role magnets play in our everyday lives, such as in electric motors and the memory in our computer hard drives.

EMR is one of the most interdisciplinary fields in the Magnet Lab, with areas of study in everything from condensed matter physics to biology and chemistry.

Montana was a beautiful place. We lived in the middle of a valley surrounded by mountains. The scenery was just beautiful and there was, of course, a lot of skiing. But it was remote, and certainly in my area of physics it was a little isolated. My wife is from Florida, and I think we felt a bit isolated there. I started thinking about trying to come back. Then, in 2001, a position became available at UF and we had the chance to move back to Florida.

And then you stayed at University of Florida until this year?

I had no intention of leaving UF, but the opportunity came up to lead the EMR group here. I've been involved in this program, for quite some time. Moving was so easy relationship-wise, because I knew almost everyone. There were obviously new people, but I had been coming back to do work here the whole time anyway, and many of the people from my early days as a postdoc had either returned or never left. It has definitely felt like a homecoming. ■