On Wednesday, November 13th 2013, the CMS Career Committee and the LPC hosted a panel discussion on working in industry at Fermilab. Sarah Eno (UMD) and Sean Kalafut (UMN) moderated the discussion, and received invaluable help from Sudhir Malik (FNAL/UNL), the LPC coordinators Boaz Klima (FNAL), Meenakshi Narain (Brown), and Rick Cavanaugh (FNAL/UIC), and FNAL A/V experts Sheila Cisko and Al Johnson. The event featured 9 former CMS members who now work in different sectors of industry. 8 of these people were able to participate in the event in person at FNAL, and one participated in the discussion over the phone.

SUMMARY OF EVENT

Attendance: 70 people in person, 25 people connected remotely

The 9 panelists were David Lopes Pegna from Apple, Jim Pivarski from Open Data Group, Gena Kukartsev from Pearson North America, Steven Won from Boston Consulting Group, Jeff Klukas from Epic, Vasu Chetluru from Jump Trading, Dave Evans from Narrative Science, Dongwook Jang from Nokia, and Guillermo Rangel from SkyHigh Networks. All of the panelists, with the exception of Steven Won and Gena Kukarzev, are currently employed in jobs that focus on software development and large scale data analysis. Each panelist answered the following question

What do you wish you had known about working in industry and finding a job in industry when you started your job search?

and several other questions from the audience. A summary of the knowledge and advice each panelist gave in response to all questions is given below.

The majority of the questions asked by the audience were directed at the entire panel, and each panelist gave excellent responses to the questions they chose to answer. All panelists highly recommended learning as much as possible about a company before going into an interview. They recommended searching glassdoor.com, LinkedIn, Google, company websites, the Wall Street Journal or similar publications, and the Securities and Exchange Commission's website (for publicly traded companies or financial firms).

David Lopes Pegna participated in the discussion over the phone. I had difficulty understanding David due to where I was sitting in the lecture hall, so unfortunately I can't provide a summary of what he discussed.

Jim Pivarski emphasized thinking about job opportunities on a computer science spectrum. Data analysis that many CMS PhD students are familiar with can be completed successfully without rigorous knowledge of computer science fundamentals and program optimization. Software development and deployment positions in industry require rigorous knowledge of computer science fundamentals, and rigorous algorithm testing before deployment. Jim gave an interesting story about how he got his first job at Open Data Group. Before the interview he was debating whether or not to mention a seemingly insignificant open source coding project on his resume. He ultimately decided to list this open source project on the resume, and found out after getting the job this project was vital to him being hired.
When applying for data scientist jobs, Jim emphasized listing publicly accessible code on your resume for employers to explore.

Gena Kukartsev thoroughly planned his answer to the general 'before you started working in

industry' question. He prepared a list of approximately 20 items that he wished he had known when he started his job search in the late 2000s. He encouraged people to relentlessly apply for any job that looks interesting and fits your desired lifestyle and geographic location. He highly recommended asking friends and colleagues who work at interesting companies to write recommendation letters for your job applications. Gena submitted two job applications that included recommendation letters from friends or colleagues that worked at the company he was applying to. One of these job applications was to Pearson North America, and Gena was ultimately hired by them. Gena is developing a website about science PhD students and postdocs transitioning from academia to industry. There is lots of interesting content on this site, and can be found at

http://sciencejobshq.com/

Steven Won gave an encouraging view of jobs for physicists outside of data scientist roles. Steven's job search was by far the fastest of any of the panelists, and has truly enjoyed his work in industry. Steven applied to three jobs, one at each of the big 3 management consulting firms. He had a successful interview with Boston Consulting Group and was ultimately hired by them as a business analyst. During his interview his employers expected very rudimentary knowledge of business, which Steven summarized as "choices that result in money gained are good; choices that result in money lost should be avoided". Steven's message was that physicists are smart people who are very good at executing quantitative analyses to confirm qualitative predictions or answer questions. In particle physics examples of such questions are why are the weak vector bosons massive, or what is the proton PDF at square root s equal to 14 TeV. In business, some broadly interesting and challenging questions that can be answered with data analysis are should company A purchase a controlling stake in company B, or what securities should be purchased to limit the sensitivity of an oil refiner's net profit to the price of crude oil.

Jeff Klukas gave another interesting perspective on being hired into an industry that most physicists know little about. Jeff was hired by Epic, a healthcare software company in Wisconsin, after completing his PhD at University of Wisconsin - Madison. At the time Jeff knew a significant amount about data analysis and programming in several computer languages, but very little about the healthcare industry. Jeff learned soon after he was hired that his lack of knowledge on the healthcare industry didn't matter, and Epic hires lots of people with strong software and data analysis backgrounds that initially know little about the healthcare industry. Jeff went through an extensive 4-6 month training program to learn about the healthcare industry, and how he will be involved, before spending significant time on new work related to his job. Jeff said this practice of hiring talented people and training them in industry specifics is common in the healthcare industry. Jeff recommended listing publicly visible code that you developed on your resume.

Vasu Chetluru works as a data scientist at Jump Trading. When she first saw the posting for the job she was ultimately hired into, she was skeptical of applying for the position. The job description looked interesting, but the job degree requirements were listed as a bachelors degree in computer science, math, or related fields. She applied for the job, and met with Jump Trading representatives. This meeting made Jump Trading realize they were actually looking for job candidates with a PhD in computer science, math, or related fields, and ultimately Vasu was hired. Her message to CMS PhD students and postdocs applying for industry jobs was apply early and often, list publicly visible coding projects on your resume, obtain a work VISA before applying for jobs, and don't always assume the people developing a job advertisement know exactly what they are looking for in a new hire candidate!

Dongwook Jang was at a slight disadvantage in terms of delivering new knowledge because he was one of the last panelists to respond to the general question. He highly recommended getting a work VISA before applying for jobs. He also recommended talking to current employees about the work environment when visiting a company's office for an interview. Dongwook was initially hired into Nokia as a software developer, but his duties in that role were much broader than what his job title implied.

Dave Evans works at a small software development company called Narrative Science in Illinois. He was initially hired as a data scientist, and is now a hiring manager and data scientist for the company. He made several recommendations related to interviews and applying to jobs. Approximately $25,000 is needed for a company to acquire a work VISA for a new employee. This cost is a huge barrier for small companies, so having a work VISA before applying for jobs, and certainly before interviews, is highly recommended. Dave recommended starting a GitHub account, posting code to this account, and referencing this account on your resume. He also recommended being ready to explain everything on your resume before going into an interview, and reviewing computer science fundamentals before interviewing for data scientist or software developer positions.

Guillermo Rangel works as a data scientist at SkyHigh Networks. He described the geographic distribution of U.S. data scientist jobs as being centered at silicon valley and the San Francisco bay area, with New York and Chicago being data science centers of lower magnitude than California. Guillermo traveled an interesting route between CMS and his current job. After leaving CMS he could not find a full time position with an interesting company, so he applied and was hired as an intern at a company he was interested in working at. After a few months Guillermo was hired into a full time, permanent position, with interesting work tasks and responsibilities.

There were enough people in attendance to have 50 minutes of questions and answers, which ended at approximately 7:40 pm. After this informative large group discussion Sarah Eno invited the audience down to the front of the hall to have some snacks and talk with the panelists in smaller groups. All the panelists were happy to stay and talk with audience members. This smaller group discussion format was the most energetic part of the evening. The panelists were smiling and having a good time, and the people from the audience were excited to ask the remaining questions they had. These small group discussions continued until approximately 8:20 pm.