Statement of Research Interests

Dr. Andrew C. Haas

I have greatly enjoyed being a part of the DZero experiment. The data from DZero has already enabled me to perform cutting-edge searches for various signatures of the Higgs boson and Supersymmetry. Given that DZero is planning to continue to collect data through at least 2009, and that significant discoveries are possible, I would like to remain an active member of the DZero experiment. In particular I would like to remain focused on the search for the Standard Model Higgs boson. Extrapolations of the sensitivity of the current analyses indicates that DZero, combined with CDF, have a real chance of observing a light Higgs boson by 2009. This means that the Tevatron experiments could discover the Higgs boson before the LHC experiments have collected enough data, and understood it well enough, to do so. Realizing these chances will require significant effort optimizing the Higgs analyses and detector performance. I would plan on extending my current search for the Higgs boson in the ZH di-lepton channel, using new data and more advanced analysis methods. In addition I would work on several reconstruction tasks, such as improved bottom-quark jet tagging and di-jet invariant mass resolution. There is also a strong possibility that I could move into a leadership role in the DZero Higgs group, where I would help to coordinate efforts and represent DZero's Higgs program to the wider physics community.

In addition I would like to continue to use the large dataset from DZero to search for other new physics beyond the Standard Model. There are potentially dramatic discoveries waiting to be uncovered in DZero's data already! Finding the new physics requires performing a dedicated analysis for the given signature. For instance, I am interested in a model being put forth by one of UW's own theorists, which predicts events with displaced jets. I have already begun preliminary studies of this scenario, and I would like to develop a full analysis of this model, leading to a publication, and hopefully a discovery!

With ATLAS getting ready for an engineering run in late 2007, and high-energy data in 2008, more of my interest would shift towards this next-generation experiment as data draws nearer. I would continue to help with the commissioning of the detector and software, as well as becoming even more involved in plans for triggering and physics analyses. My goal would be to make sure that myself, and the UW group including students and post-docs, are ready to analyze and understand the first data from ATLAS, in search of new discoveries. As DZero stops taking data, I would transition to spending all of my research time on ATLAS. Hopefully what I am interested in at ATLAS will be greatly influenced by discoveries in the initial ATLAS data, or even from DZero! But otherwise I would likely continue to search for new phenomena such as Supersymmetry, or other more exotic signatures of new physics. This transition from the Tevatron experiments to those of the LHC will be a lot of hard work, analyzing data as carefully as possible from an existing experiment while preparing for a new experiment. But the reward is that these next few years promise to be an extremely exciting time in experimental particle physics.