Hans Wenzel

Statement of research interests:

In the past years I have been working for the CMS experiment at the LHC which is scheduled to begin operation in 2007. The LHC will start a new era in high energy physics where new phenomena with high rates and spectacular signatures might be seen at the beginning. The main goal besides the search for the Higgs particle is to search for physics beyond the standard model (e.g. SUSY). It will take a lot of work to make the experiment work and various steps are needed to understand and calibrate the detector from beam tests, to cosmics runs, to first collisions. Therefore I would like to contribute to the understanding of the detector by getting involved in a detector sub group (e.g. Pixels, muons, tracking) and if possible contribute to test beam and cosmic ray test activities were my expertise in on-line monitoring and tracking might be useful. CMS right now is in a similar situation as CDF when I joined the experiment in 1990. At that time we integrated a new sub-detector system, the Silicon Vertex detector, into an existing experiment. Run I of the Tevatron was a very exciting time for a High energy physicist. First we observed evidence and finally discovered the top quark 10 years ago. The situation at the CMS is much more challenging since it is a completely new detector.

I think it's very beneficial to be involved in a running experiment and provide students with the possibility to analyze actual data compared to doing Monte Carlo studies. As a member of the CDF experiment my main physics interest were b and top-quark physics where I could benefit from my knowledge of the SVX tracking. I worked on b-lifetimes, b-tagging, rare b-decays and $B\bar{B}$ - mixing. This measurements give access to the elements of the CKM quark mixing matrix which are fundamental parameters of the Standard Model. While performing searches for rare b-decays I became interested in physics beyond the standard model which might be first observed in measurements of rare b-decays. We were able to constantly improve the measurements by adding new data channels (e.g. $J/\psi \rightarrow e^+e^-$ for the lifetime measurements) or by improving the analysis methods by introducing new fitting methods or better selection criteria. Over the past month I started to work on redoing the $B^0_d \rightarrow e\mu$ and $B^0_s \rightarrow e\mu$ search. Compared to run I we use more data and we use the data sample provided by the SVT (Silicon Vertex Trigger) two track trigger compared to the $e\mu$ - dilepton trigger used in run I. In addition we use the $B \rightarrow$ hadrons signal as a reference signal to avoid having to understand the absolute efficiency of the SVT trigger in detail. So far this looks very promising and we might improve the limit by several orders of magnitude. I was able to directly contribute using the run I experience as well as resurrecting the our programs and port them to C++.

I also did Monte Carlo studies which use d-ϕ-z correlations of tracks reconstructed in the silicon detector to estimate the position of the beam as well as the beam parameters: z0, β^* and emittance: ϵ. The advantage of this method is that no fitting of the primary vertex is required.

I am always interested in all aspects of an experiment including reconstruction software, DAQ, building and testing detectors. Therefore I would welcome the opportunity to take part in detector construction or detector R&D for the SLHC or the linear collider.