WIT2010 Workshop on Intelligent Trackers

Wednesday, 3 February 2010 - Friday, 5 February 2010

Lawrence Berkeley National Lab

Scientific Programme

With the increasing capabilities of microelectronic technology, future particle detectors will be able to yield new primitive quantities that are not intrinsic properties of the sensing media used. The ability to compute new primitives in near real-time is what we characterize as "intelligence". This will enable the construction of detectors with novel functionality without the need to discover new sensing media with unusual physical properties. Two examples of new primitives are near real-time charged particle direction or charge clusters without pixel boundary effects. But the addition of such intelligence has practical challenges and in particular system issues must be addressed, such as material budget and power density. This Workshop would provide a discussion forum for the community of scientists and engineers working on development of intelligent devices. The objectives of the workshop will be to enhance the cross breeding of ideas, to compare concepts for incorporating intelligence in particle trackers, and to explore possibilities for application to other areas or primitives.

Registration for the workshop will be by invitation following review of abstracts. The abstract submission deadline is November 15, 2009. Proceedings of the workshop will be published in JINST.

Applications of intelligent detectors

Applications will define the physics requirements. For example in the case of a track angle measurement device, is something that can measure angles with a certain resolution at a certain rate actually useful? What separation and position of layers is needed and what pixel of strip size. Never mind how to connect it all together.

Coupled layer and monolithic architectures

Basic designs for trackers that measure angle, or some other primary. Not so much emphasis on the application itself, but in the construction and operation.

Development of specific components, for example low mass interposers

R&D work on novel interconnects etc.

Electronic circuits (3D and conventional)

Development of new IC's for implementation of on-detector intelligence.

High speed communication

High bandwidth connections to the off-detector DAQ may be needed. How can they be implemented?

System integration

Cooling, mechanics, etc. to solve specific challenges presented by structures implementing local intelligence (as opposed to generic developments applicable to conventional trackers).