Contribution ID: **7** Type: **Oral presentation**

Analysis of data compresssion efficiency in silicon detector readout

Thursday 15 May 2014 14:00 (30 minutes)

On-detector intelligence permits a reduction of the information to be sent off detector. In the best case this permits the scrutiny of every event before any trigger decision. This work investigates what is the minimum number of bits needed to send a given amount of information off detector. This permits a systematic analysis of the readout efficiency relative to this
theoretical minimum number of bits. The greater the readout efficiency the lower the burden on the processing needed to reduce information. Different level efficiencies are defined to include context information and engineering properties needed for reliable transmission, such as DC-balance. A commonly used encoding method is analyzed as an example and found to have an efficiency only of order 50\%. A new encoding method called Pattern Overlay Compression is introduced to illustrate how the systematic analysis can guide the construction of more efficient readout methods. Pattern Overlay Compression significantly outperforms the above example in the occupancy range relevant of strip detector readout. These results are documented in a paper submitted to JIST that can be found here: http://arxiv.org/abs/1309.1869. The analysis of pixel detector readout introduces added complications. On-going work on pixel readout will be presented along with results on strip detector readout.

Summary

see http://arxiv.org/abs/1309.1869

Author: GARCIA-SCIVERES, Mauricio (Lawrence Berkeley National Lab. (US))

Co-author: WANG, Xinkang (UC Berkeley)

Presenter: GARCIA-SCIVERES, Mauricio (Lawrence Berkeley National Lab. (US))