Fast Timing R&D for CMS Phase II Endcap Upgrade

Sebastian White EC Group Mtg. June 17, 2014

an update on progress and plans for the coming year

(Shashlik-specific activity not part of our scope)

- we have been working on "fast timing for high rate environments" for past 7 years. DOE Advanced Detector Award by that name started in 2010 (co-PI with Kirk McDonald)
- encouraged by Joe Incandela in 2012 to change emphasis from PPS-like application to more urgent Phase II EC upgrade
- for the past year I've been following a mandate from US-CMS management to: "plan the strategy for inclusion of timing in the Phase II detector, and ....build a community that goes beyond CMS to help develop these ideas and concepts."
- this has been fruitful, eg:

1)

Development of Precision Timing Pileup Mitigation Tools within the Context of a Dual Readout Calorimeter for CMS: *Proposal Submitted to US-CMS*

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2)

Request for Project Funding from the RD51 Common Fund

- Date: *20-05-2014*

Title of project: Fast Timing for High-Rate Environments: A Micromegas Solution

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Currently 1) funded by US-CMS and 2) awaiting RD51 response but work started at Saclay. Some related activities:

-high bandwidth transimpedence amplifier development with U. Pennsylvania (leading to ASIC chip)

-CMS physics simulation in CMSSW_6_2_0_SLHC14 at Princeton and Rutgers with baseline timing detector installed by Sunanda

-SBIR application to explore large scale production techniques of capacitive readout Si sensors

-detector simulation (with RD50 for Si and by Rob Veenhof for Gas PMT).

-collaboration with Hamamatsu on Gas PMT future development

-study readout architectures for CMS. past work with Saclay and PSI on latest WFDs. Chris Tully thinking about CMS specific issues. We have earlier experience on design of a clock distribution system.

-aging/rad-dam studies