

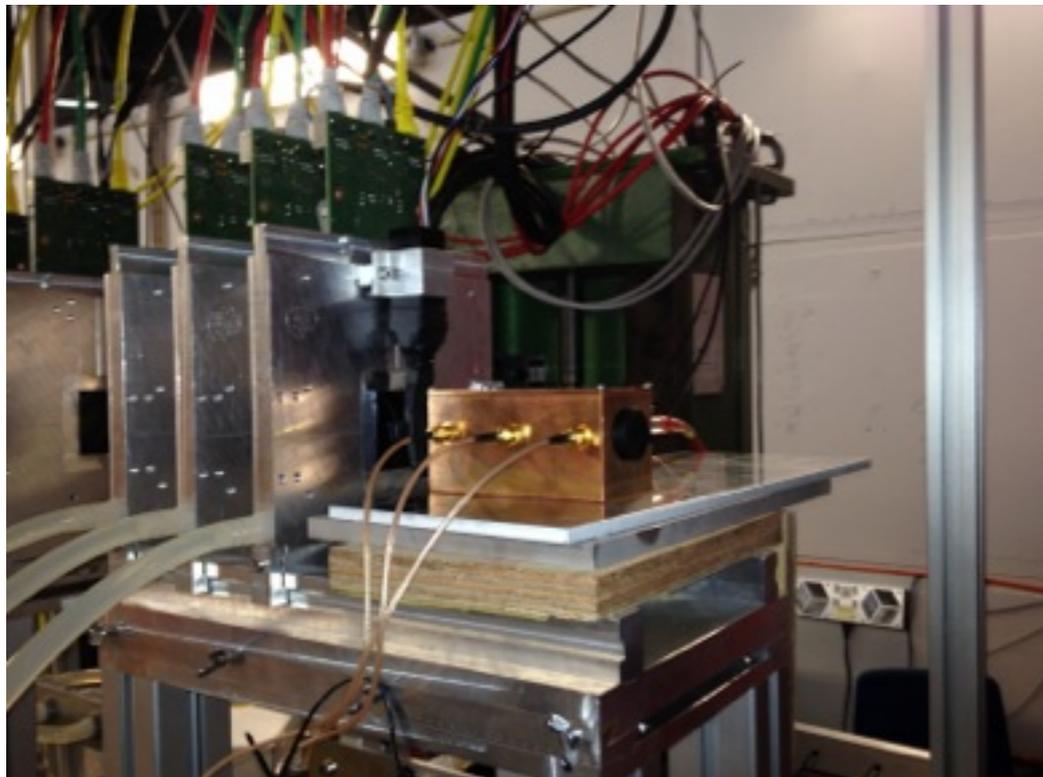
Test Beam plans for MPGD Fast Timing Group

RD51 meeting

CERN, March 20, 2015

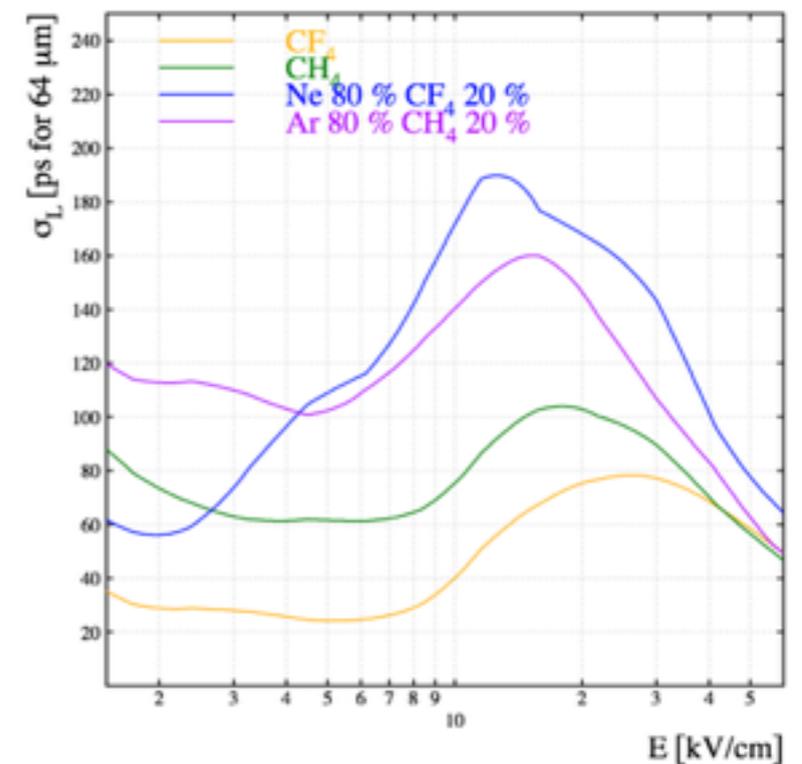
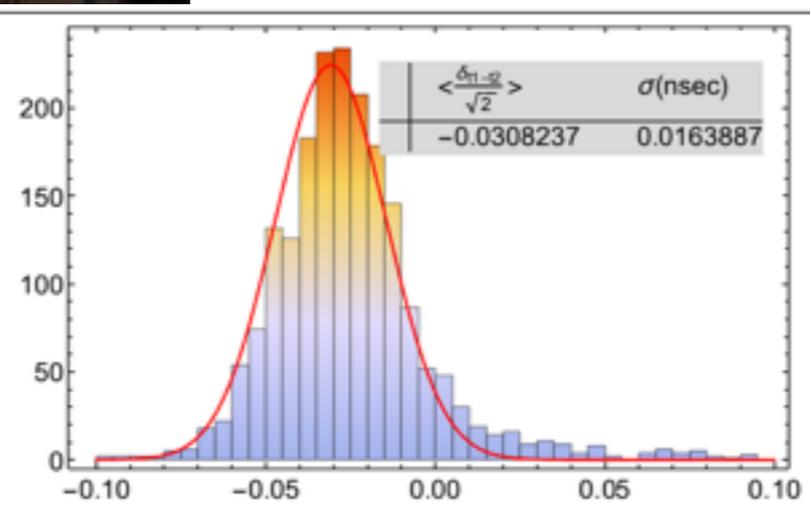
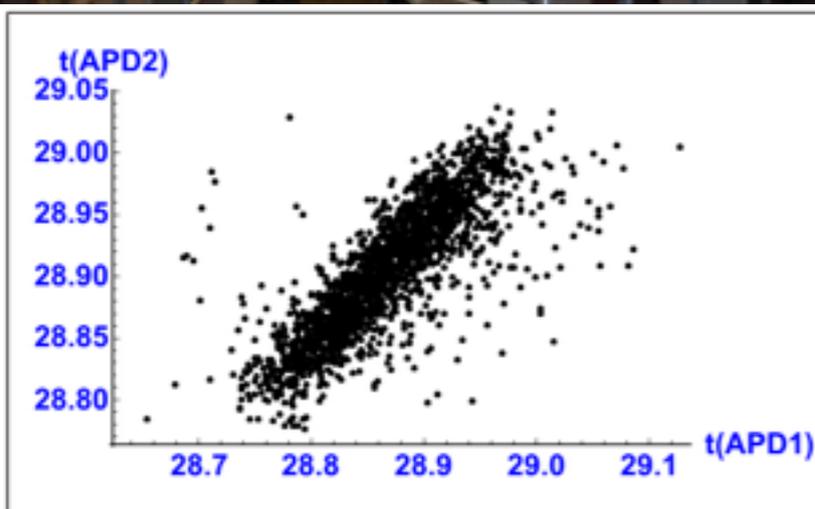
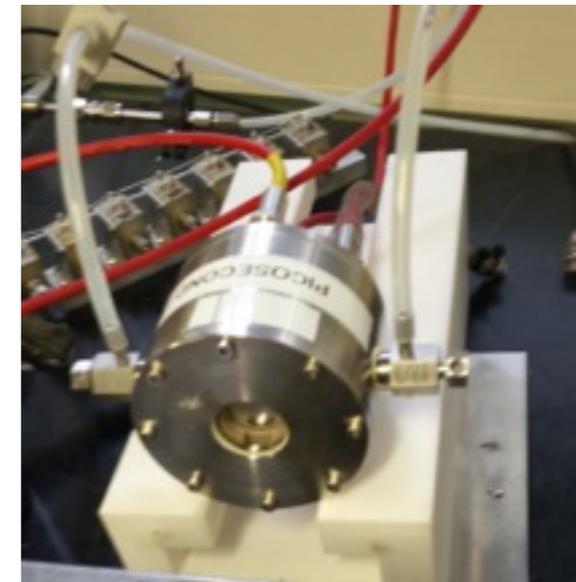
Sebastian White, CERN/Princeton

Si technology



MPGD technology

(see following talk by Thomas Papaevangelou)



Collaborators:

- new tools for pileup mitigation based on timing: Started 2007 in FP420, 2010 DOE ADR&D and ATF AE55(McDonald and White,co-PIs), in 2014 USCMS&RD51

US-CMS PhaseII R&D

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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RMD/DYNASIL:

Richard Farrell, Mickel McClish

FEE development:

Mitch Newcomer, Susan Fowler, Brig Williams (U. Penn.)

Hamamatsu Photonics:

Motohiro Suyama

Photocathode Development:

Anatoly Ronzhin (FNAL)

DAQ techniques:

Eric Delagnes, Dominique Breton, Herve Grabas, Stefan Ritt, LRS/Teledyne, Roman Zuyewski

RD51

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
Contact persons:	Sebastian White (co-PI), CERN/ Rockefeller sebastian.white@cern.ch Ioannis Giomataris (co-PI), Saclay ioa@hep.saclay cea.fr
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Ext. Collaborators:	<ol style="list-style-type: none">1. Rockefeller/FNAL, contact person Sebastian White swhite@rockefeller.edu2. Princeton University, contact person K.T. McDonald,

pileup mitigation challenge

see. S. White, "R&D for a Dedicated Fast Timing Layer in the CMS Endcap Upgrade", Proceedings of 2014 Workshop on Picosecond timing
<http://arxiv.org/abs/1409.1165>

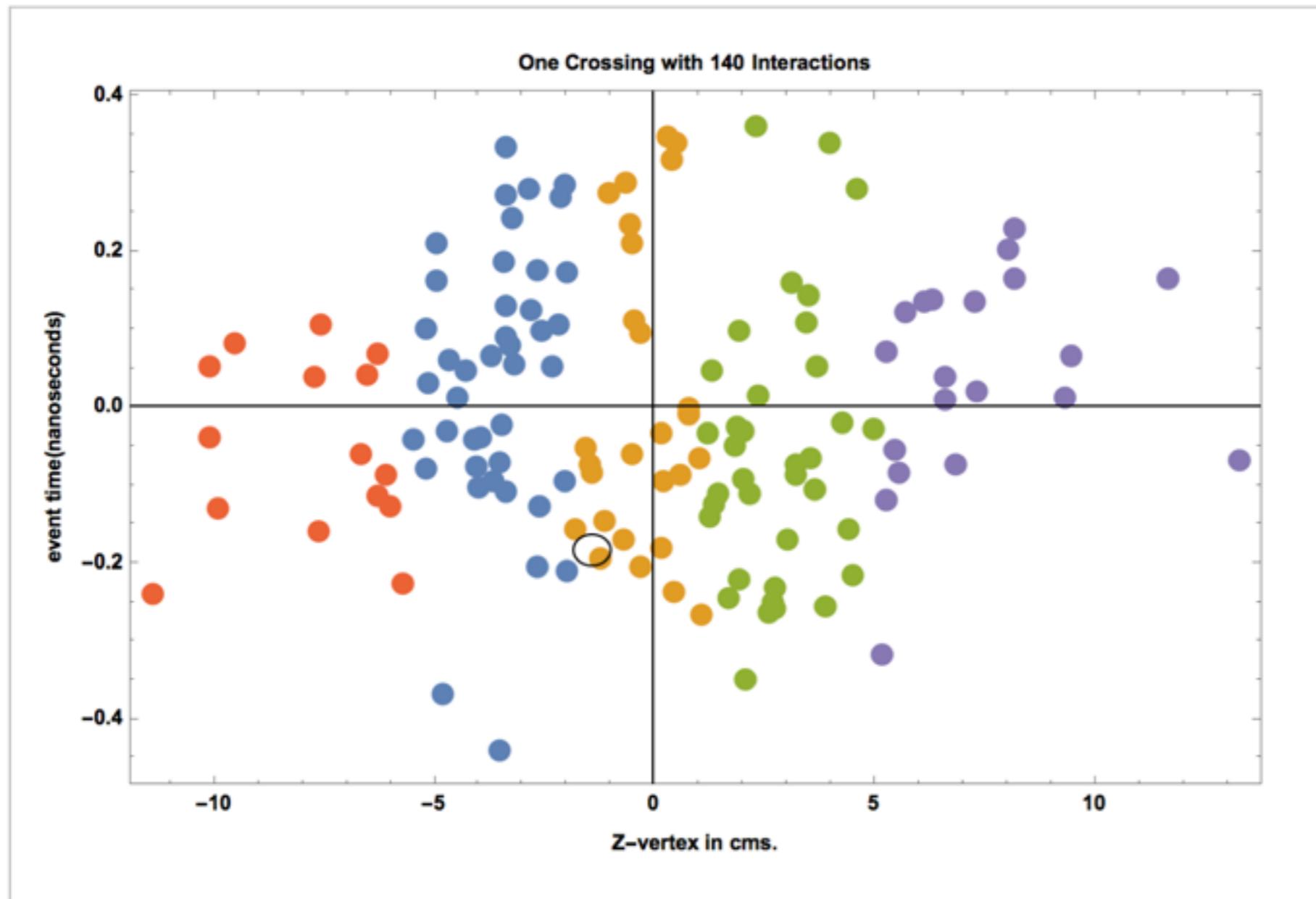
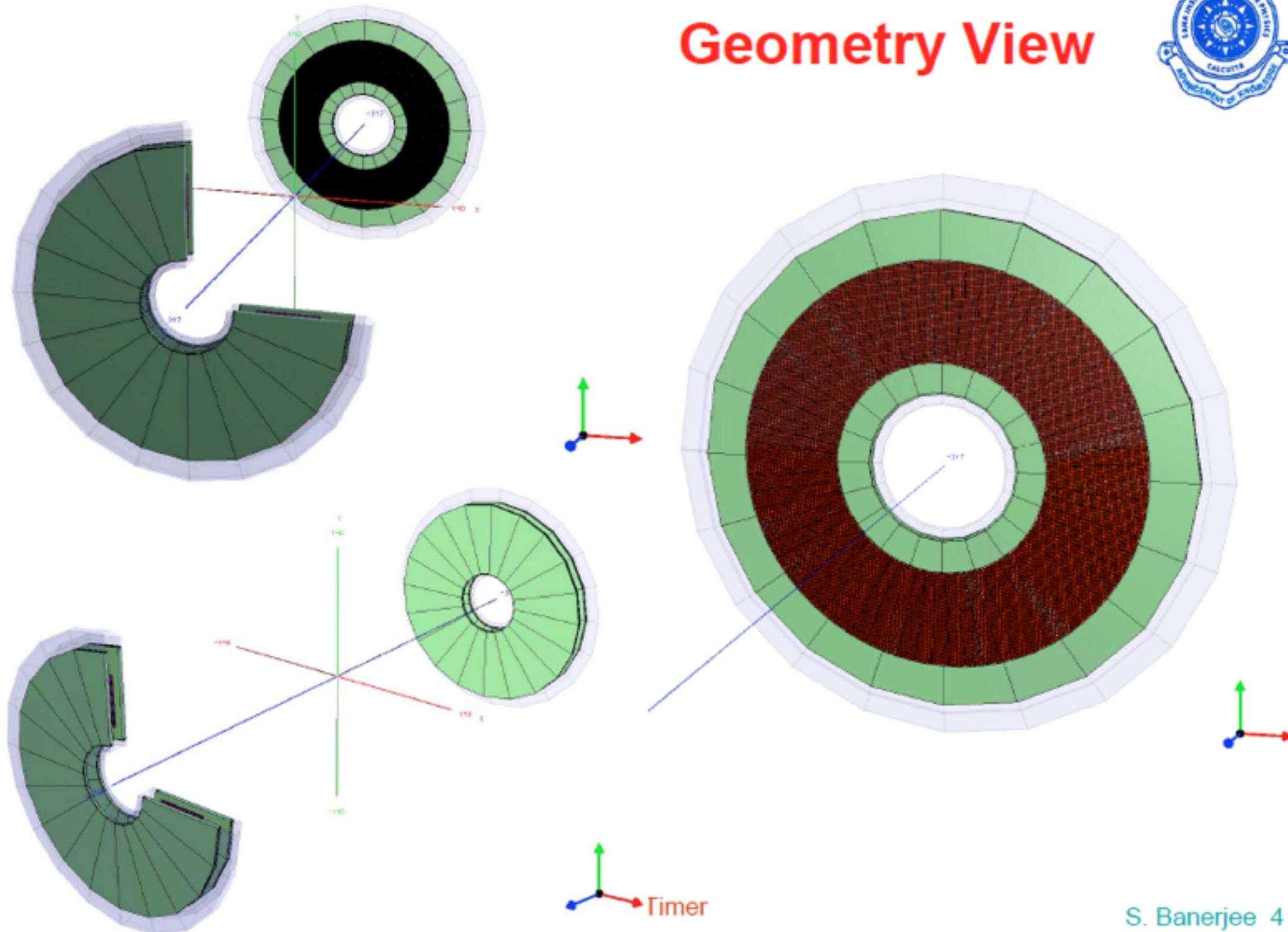


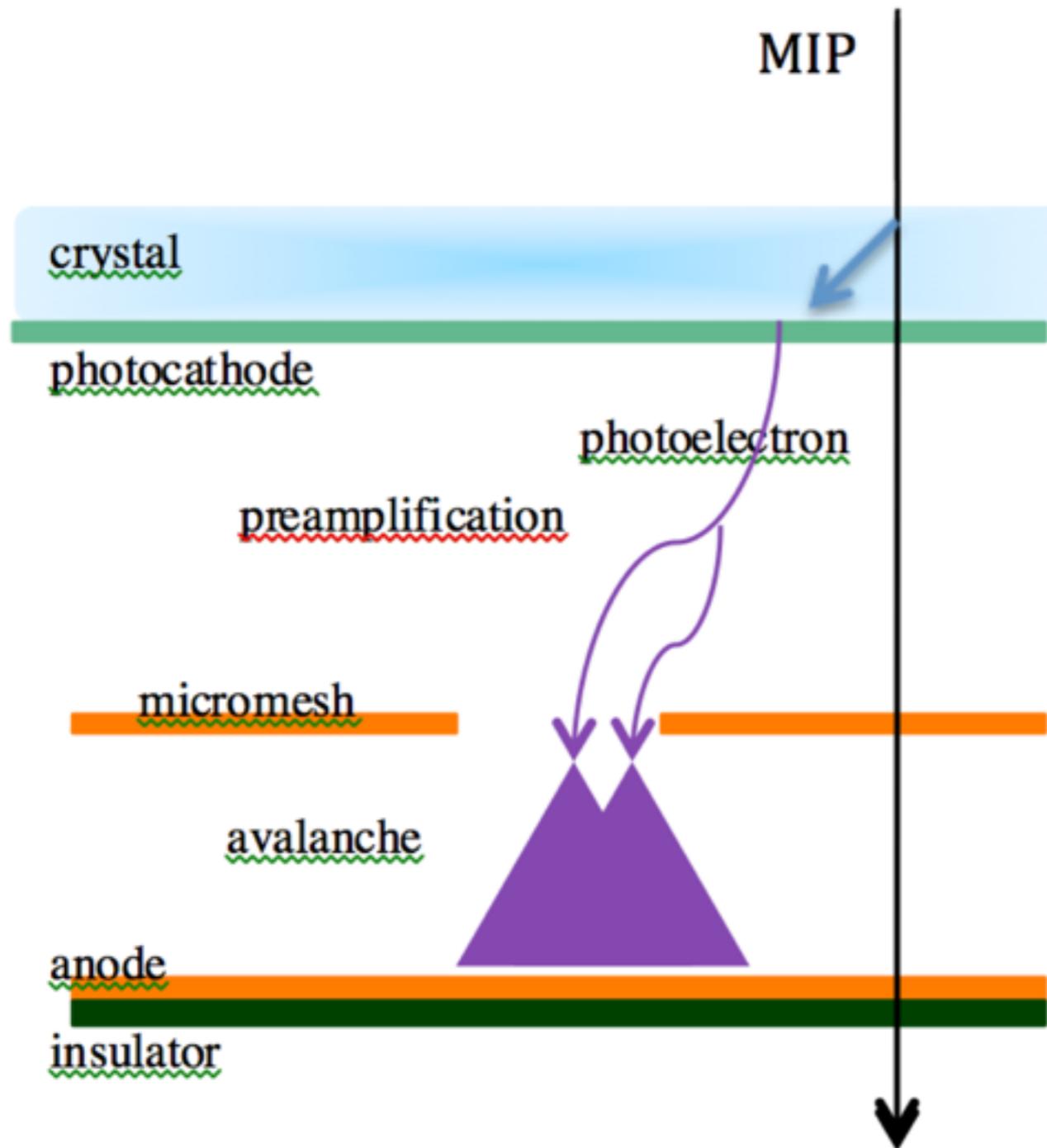
Fig. 1. Simulation of the space(z-vertex) and time distribution of interactions within a single bunch crossing in CMS at a pileup of 140 events- using LHC design book for crossing angle, emittance, etc. Typically events are distributed with an rms-in time- of 170 picoseconds, independent of vertex position.

Our group has been developing a dedicated fast timing solution with Si or MPGD options for end cap

Geometry View



Initial testing (see following talk by Thomas) as a photodetector. This establishes proof of concept. To be followed by beam tests as charged particle timing detector.



We have been constructing 2 devices to demonstrate the concept:

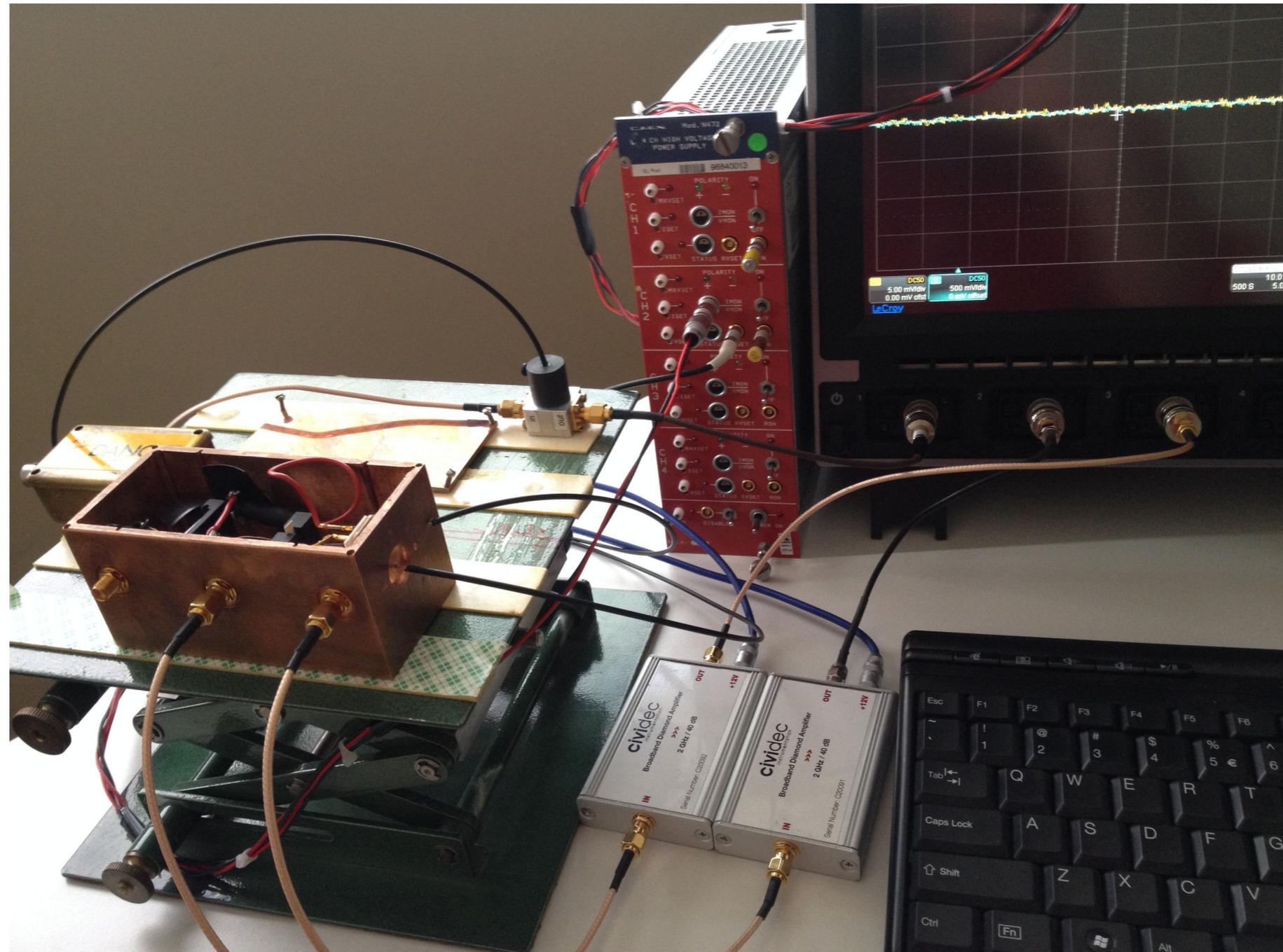
One at CERN, nearing completion.

One at Saclay recently completed and tested with flash lamp

Week of March 9th-> 1st exposure at Saclay Laser-matter Interaction Facility



limited support services required for beam test (Si Hyperfast timing telescope shown below).
laser source for calibration/vcSEL shown here.
high bandwidth amplifiers
Digital scope daq connected to CR via network. (or SAMPIC or DRS4,v5, etc...)
identical in case where we operate MPGD in sealed mode.



Ahead of beam test

- still some discussion about completing evaluation of Saclay chamber and 2nd chamber in production at CERN.
- then next priority will be evaluation in charged particle beam
- nominally 3- 8hr shifts separated by a day each
- ~few kHz/spill. ~1cm beam spot
- electrons, muons, pi, protons
- electron possibly of interest to evaluate SEM @preshower