

SVD Activities at Tohoku (Both Software and Hardware)

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SVD at Tohoku

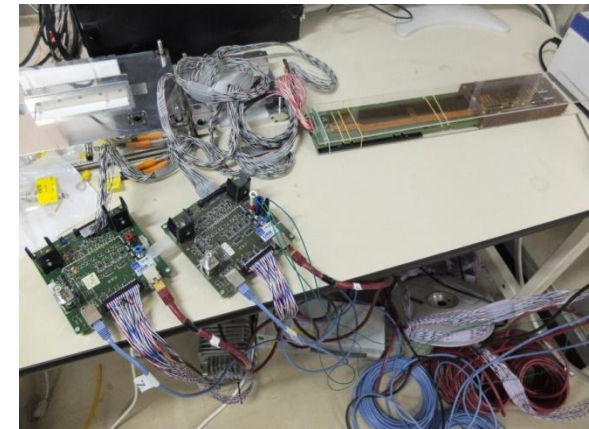
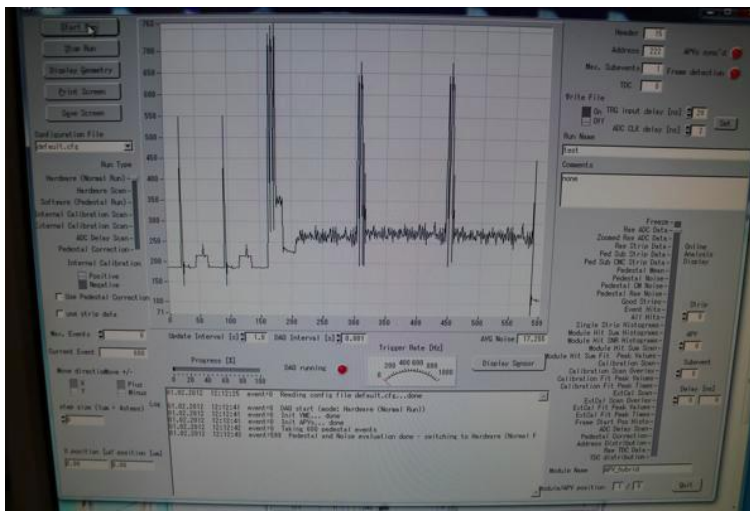
- As you know, Onuki-san who led the Tohoku SVD group, moved to Tokyo from last December.
- So, I joined to SVD group last November to continue SVD activities at Tohoku.
- SVD ladder assembly, led by Onuki-san, is now main task at Tokyo so we should find other works. (Of course Tokyo and Tohoku works closely for SVD)
- After discussion with Tsuboyama-san (hardware) and Hara-san (software), we decided
 - Quality Assessment (QA) system for ladder assembly
 - FTB-COPPER data transfer using Belle2Link
 - Beam background simulation
 - Offline Data modeling

QA system

- SVD ladders to be assembled at IPMU should be **checked the quality in each assembly step.**
 - Dead/Noisy channel check.
 - Laser check?
 - But cannot irradiate laser after Origami integration.
 - Radioactive source check?
 - Etc.
- We need to develop the automatic QA system which anyone can use it.
- Hopefully, we have APVDAQ system developed by Vienna group at Tohoku, we started with it and will understand how it works, and then we will develop the QA system.

APVDAQ

- Negishi learnt how to run APVDAQ system from Tsuboyama-san, and finally we could see the noise from the test module at Tohoku last week.
- We will
 - look into the software deeply.
 - take data with applying HV.
- TuxDAQ is also usable?
 - We prefer analysis with ROOT macro.

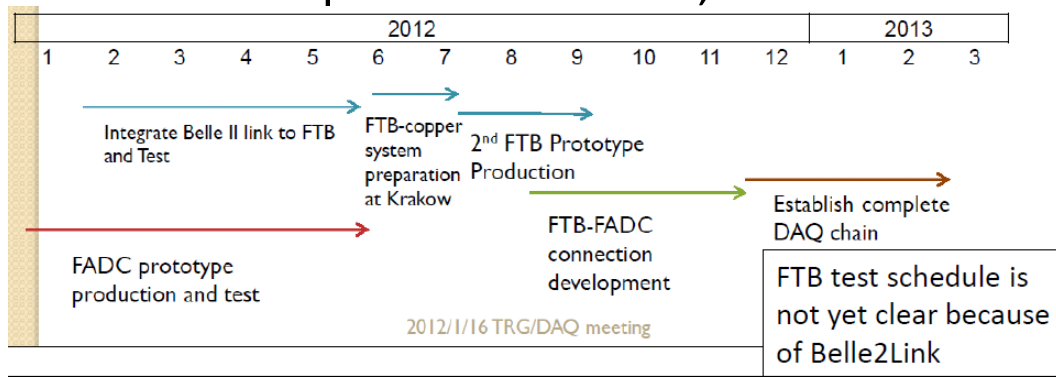


FTB-COPPER

- Need to establish the connection btw FTB(spartan) and COPPER(virtex) by the end of April so that we should finish the full DAQ chain (FADC-FTB-COPPER) by the BPAC on Mar 2013.
 - FADC : Vienna
 - FTB : Krakow
 - FADC-FTB connection : Krakow
 - FTB-COPPER connection : KEK, Tohoku



- Saito just started the integration of Belle2Link to FTB
 - Together with and helps from Hara-kun, Nakao-san and Wacek.



Background Simulation



Background occupancies

Percentage of strips fired by background radiation.
The two columns show data for 1 μ s and for 50 ns.
Acceptance threshold is 5000 e-; strong influence on results.
Not to be taken for granted! (sorry): the digitizer is not validated.

Layer	Occupancy 1 μ s	Occupancy 50 ns
3	0.6%	0.03%
4	0.2%	0.01%
5	0.2%	0.01%
6	0.2%	0.01%

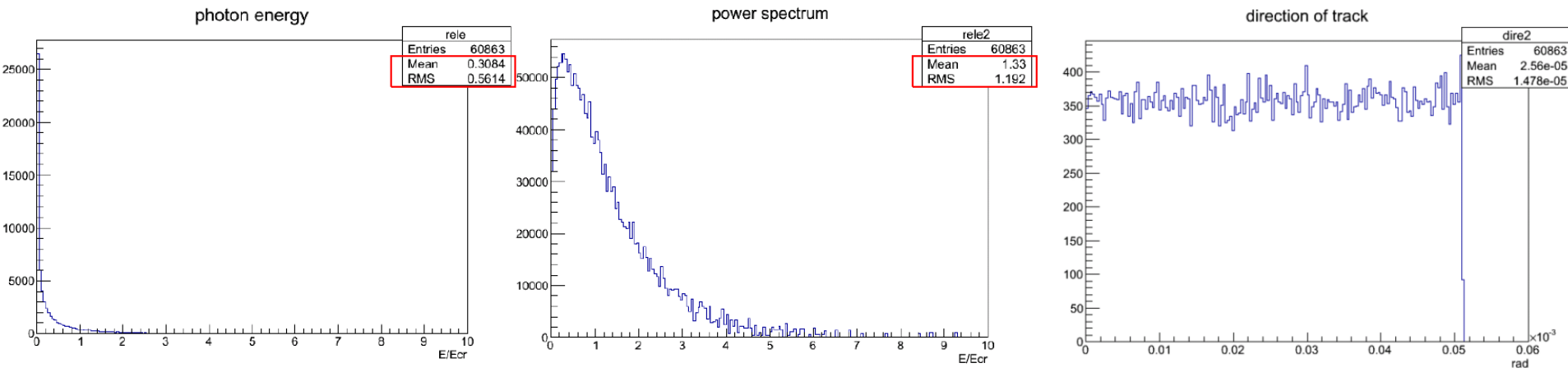
10th B2GM, KEK, 16-20 November 2011

P. Kvasnicka: SVD Background

- Touschek background simulated with Nakayama-san is checked by Peter with his digitizer, and found the occupancy due to it is small.
- Synchrotron Radiation (SR) is the last background which is not checked.
- SR was one of the most important backgrounds to SVD.
 - SVD 1.0 electronics was killed by SR
 - Miniaturized VATA and gold plated beam pipe solved the problem.
- We are trying to implement the SR generator to basf2 GEANT4 framework with Nakayama-san to check how severe the backgrounds to all Belle2 subdetectors.

SR in GEANT4 Standalone

- Itagaki have checked the SR physics models in GEANT4 standalone mode.
 - Photon energy/power spectra $P_\gamma(x) = \frac{9\sqrt{3}}{8\pi} x \int_x^\infty K_{5/3}(t) dt$
 - Photon direction
- Now, he is implementing the generator to basf2 and hopefully the results using the generator will be shown at BPAC in Feb.



Raw Data Modeling

- For Belle1 SVD, there are several raw data models for commissioning (see Belle note #464 in detail)
 - Real raw data
 - Pedestal subtracted
 - Common mode noise subtracted
- For Belle2 SVD, time sliced information is available, so the raw data models might be larger.
 - Time sliced/integrated
 - Noise hit suppression using timing information
- The raw data format, I guess, will be designed by Vienna group.

Offline Data Modeling

- So our task is to design data model converted from raw data at offline and converter itself in order to
 - (1)handle all of the raw data models
 - (2) perform the full SVD detector/tracking simulation.
- We need close communication with Vienna raw data modeling guys and offline calibration guys.
- I am now reading the SVD1 data format and its converter.
 - This should be very good example.
- And new Belle student will work on it from next JFY.

Summary

- We just started
 - QA system for ladder assembly
 - FTB-COPPER connection
 - Background simulation
 - (to be started) Offline Data modeling