

Potential contributions within the Belle II for new collaborators

SVD

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A new assembly site

- Option 1: Sharing layer 5 or 6 ladder assembly with Vienna group.
- Option 2: Assembly of forward and backward sensor (DSSD) modules(*), common to layer 4 to 6.
 - Needs clean room with wire bonding, coordinate measurement machine and (preferably) climate chamber
 - Prepare assembly jigs
 - Perform assembly of ladders from its parts (involves several steps of gluing and bonding)
 - Prepare of transfer jigs
 - Introduction/Training can be done by either IPMU or Vienna people.

(*) Note: SVD ladders consist of ORIGAMI sensor modules and forward and backward sensor modules. Origami modules are for the chip-on-sensor readout in the central part of ladders. In the forward and backward modules, signal from sensors is read out with conventional structure: sensor/flex/hybrid. The Belle2 SVD ladders are designed to use common Origami, forward and backward modules.

Electronics

- Power supplies:
 - Produce and test rad-hard DC/DC converter modules with CERN ASIC
 - Prepare power distribution with existing Kenwood power supplies
 - Procure new/additional supplies for sensor biasing (up to $\pm 100V$)
 - Procure low voltage power supply system and replace the 10-year old power supply system that was built for the Belle SVD.
 - Finer power supply segmentation will be beneficial to adjust bias voltages for different sensor direction and position.
- FADC system:
 - Development of certain firmware blocks (e.g. GbE interface) for the FADC system
 - Production and testing of FADC system components ((part of) FPGA daughter boards and/or FADC mother boards)
- Environmental monitoring:
 - Development and production of rad-hard sensors for
 - Temperature
 - Humidity

- Instantaneous radiation
- Integrated radiation (dose)
- Pressure
- Gas flow (in, out)

to be applied in several locations in the PXD/SVD volume (and/or externally)

Software

- Monitoring software (run parameters, event display, online analysis)
- Slow- and run control software (based on EPICS and NSM2)
- Run parameter database (APV25 settings, bias voltages, bad strips, etc.)
- Details should be discussed with the SVD software coordinator.

CDC

TOP

- Calibration system
 - Laser and fiber optics
 - Laser operation system
 - Online calibration
- Environment monitor
- Software work collaborating with Ljubljana
 - Conversion from raw data to reconstruction level
 - Applying calibration constant
 - Alignment scheme
 - Database handling
- Power supply
- Cooling system

ARICH

- mirror system (planar mirrors at the edge of acceptance)
- low voltage power supplies for read-out electronics
- quality assessment (cross check) of (a few) selected HAPD

ECL

Hardware: Endcaps:(Forward and backward)

- Crystal production and parameters measurement
- PP production and parameters measurement
- design of counter
- assembling counters
- measurement of the counters
- design of support structure

- design of readout electronics (We have some version. but it needs to be further developed)
- HV

Software:

- Online
 - Local runs
 - DQM
- Offline
 - Background overlapping
 - Calibration with eegamma
 - e-id

KLM

TRIG

DAQ

COMP

Generator

- librarian of generator package
- EvtGen
 - evaluation and validation
 - maintenance (etc. update of DECAY.DEC)
 - code development with EvtGen developers (new model, Dalitz decay, new particle, etc.)
 - comparison with the Belle EvtGen interface
 - continuum (PYCONT/JSCONT-equivalent interface is needed)
 - Y5S
- KKMC + tauola
 - update of tau decay (if necessary)
 - affinity with EvtGen (photos and pythia should be used as external library in the same manner as EvtGen)
 - application to the mu-pair event
- pythia
 - evaluation
- two-photon generator
 - basf2 interface for aafhb(BDK) (used in Belle)
 - validation check of aafhb and KoralW (partially done for beam background study) (if necessary)
- cosmic generator
 - sg (used in Belle)

Simulation

- librarian of simulation package
 - treatment of secondaries
- optimization of the physics list
 - EM interaction
 - Hadron interaction
- validation check
- geometry update (support structure, cables in boundary region of sub-detectors)
- speed up the optical photon simulation (if necessary : vectorization, approximation)
- update and maintenance of the MCParticle
 - new flag to indicate the physics process in the production of the particles
- evaluation of simulated vertex class
- implementation of the mis-alignment effect (digitization base)
- development of a real beam background overlay tool (corresponding to "addbg" in Belle)

Geometry

- librarian of geometry package
 - optimization of geometry implementation
- treatment of the simplified geometry for reconstruction use (e.g. tracking, event display)
- treatment of the calibration/alignment constants (read/write/format) (work with Database group)
- implementation of the mis-alignment (geometry base)

Reconstruction

- librarian of reconstruction package
- track extrapolation to the outer sub-detectors
 - check/validation of "ext" module
 - development of a new track extrapolation tool w/ geant4/Kalman filter (how to treat the material, which level of detailed geometry is required)
- treatment of the non-uniform magnetic field in tracking
- vertex fitting (kfitter used in Belle, RAVE)
- validation of the vertex class
- Ks vertex finder (=V0 reconstruction)

Analysis

- fill the MDST objects (tracking, vertex, pi0/gamma, pid)
- analysis model (work with the physics group)
- review of particle class (work with the physics group)

Validation

- librarians of validation package
- establish the validation scheme
 - for integration-built library and release
 - for MC production
 - for DST production
- (graphical) user interface (browser-base ?, improve the current web ?)

Other

- enforce SVD software group
- review of all software
- software architect

Production

- framework for automatic calibration and alignment
- design the MC production scheme
- design the DST production scheme

Computing

- investigation of DIRAC based metadata and replica catalog
- analysis of job failure reasons
- DIRAC extensions (to pick up from Rafal)
- raw data recording scheme, automatic replication
- local resource with DIRAC

Network

- network coordinator
- contact point of the network in each institute or country

Service

- setup and maintenance of a mailing list server
- unified account management (ldap, VOMS, DIRAC)
- Mac (Windows?) support
- database and web front end for notes, publications, talks, theses

PRODUCTION IN ITALY: Open Tier XX resources to Belle2 VO