Minutes of the 48th SiD optimization meeting

28-Sep-2015

Present:

Marty Breidenbach (MB)
Norman Graf (NG)
Richard Kriske (RK)
Tom Markiewicz (TM)
Christopher Milke (CM)
Marco Oriunno (MO)
Bruce Schumm (BS)
Marcel Stanitzki (MS)
Jan Strube (JS)
Andy White (AW)

Last week's Work Items:

- Re-make the MIP response plots in units of MIPs to compare with DESY plots. Poisson statistics of how many SiPM pixels fire might still have to be implemented. (JS)

Agenda and points of discussion:

1. New SiD engineering model
    a. 30º angle between yoke barrel and door has 40 mm tolerance. The fringe field simulations were done with this gap.
    b. The mechanical forces with this new angle are very similar to the previous design with a 90º angle.
    c. Studies of earthquake safety with field on, door closed to be done.
    d. The HCAL engineering was significantly changed. The last layer of the ECAL is now connected mechanically to the first layer of the HCAL.
    e. Detailed numbers for the different detectors should live in an Excel table, to help the simulation studies implement the right numbers.
    f. https://confluence.slac.stanford.edu/display/SiD/SID+Engineering
2. Field maps for background studies:
    a. Full field map from 2001, no DID
    b. Updated field map from 2005 from FNAL; $0 < z < 625$ cm and $0 < r < 20$ cm, no DID
    c. polynomial parameterization for the DID field

    This set, together with a bunch train of GuineaPig pairs will be used to study:
    1. The effect of the change in L* on SUSY physics.

2. The effect of the dipole field on the vtx detector occupancy. Sidloi3 has no dipole field. Compare with new layout for L*=4.1 m.
3. The effect of removing the “plug” on the vtx detector occupancy and on SUSY physics. L*= 4.1 m. Compare no plug, no DID with plug+DID.

New Work Items:

- Re-make the MIP response plots in units of MIPs to compare with DESY plots. Poisson statistics of how many SiPM pixels fire might still have to be implemented. (JS)

TM’s mail summarizes the current situation of the field maps and points to existing implementations and reference code:

See my SiD Optimization meeting talks 2015-08-03 (the update) and 2015--03-02.

Slide 8:
The field stored at:
/afs/slac.stanford.edu/u/ey/tvm/geant/sid/Solenoid_5tesla.dat
is dated 6/6/2001.
This is a full field map, no DID. Extends past the coil in radius and out to large z. This is the only full field map I know about.

The field at
/afs/slac.stanford.edu/u/ey/tvm/geant/sid14mr/Solenoid_5tesla.dat
& at
/afs/slac.stanford.edu/www/accel/nlc/local/systems/beamdelivery/geant/SD/sidSolenoid_5tesla.dat
are the same and dated 10/4/2005.
These are for: 0<z<625cm and 0<r<20cm
They are from FNAL. No DID.

There is one parameterization for the DID field: I use the fortran code built into geant3 by Takashi for my study.
My talk has plots of the 2005 field and the parameterized DID field.
These are the coeff in Takashi's code:

```
      real a0/0.0015343/, a1/0.18476/, a2/0.050422/, a3/-0.092768/,
     -     a4/0.030064/, a5/-0.0039413/, a6/0.0001886/
bx=a0+a1*z+a2*zz+a3*z*zz+a4*zz*zz+a5*zz*zz*z+a6*zz*zz*zz
```

I had some issues with +bx versus -bx at +z versus -z. You should check this for yourselves.

My code is at: /afs/slac.stanford.edu/u/ea/twmark/gp

Gufld.f calls the interpolation routine ("call solenoid(....)) and adds in the parameterized bx.

To use Wes' newest fields (DID incorporated) need to have all his 601 files in the same format as Solenoid_5tesla.dat. Then the "call solenoid" routine, when pointed at the correct .dat file will interpolate for all x,y,z.

To me, the easiest thing to do is to:
1) Simulate VXD backgrounds & beamcal hits with 2005 field +parameterized DID for Beamcal positions corresponding to L*=3.5 and L*=4.1. Answer question of whether backgounds of SUSY physics change with L* change.

2) With L*=4.1m, repeat above for no antiDID. Answer question of what benefit DID brings.

3) For L*=4.1 (?) and no DID (?) simulate with & without x=y=0 "plug" and ask if it can be removed without hurting SUSY physics.

Optional:
4) Compare plots of Wes' field with (2005+parametrization) to see how different they are.
5) Repeat (1) for a given L* and Wes' field map.

Further future:
Repeat as needed when Marco gives maps w/ & w/out DID.