# A Program to Estimate Resolution for Charged Particles in GlueX

GlueX-doc-1015-v2

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**Abstract**

This note contains a documentation of the CCDB package. A package for storing and managing calibration constants database.

## Contents



## 1 Introduction

CCDB stores data as tables with columns and rows. CCDB supports:

- **Naming**. Each table is identified by path-name;
- **Versioning**. Each table may has many versions of data;
- **Branching**. So called "variations" allows to use branches of data;

As a management tool and as a data provider CCDB allows:

- C++ User API. Allows an easy access to CCDB data from C++.
- JANA API. An integration to JANA framework.
- Python API. Allows acessing and managing CCDB from python.
- Command line tools. Tools to manage CCDB data from the shell.
- Web interface.

An illustration of this list one can see on pic 1.

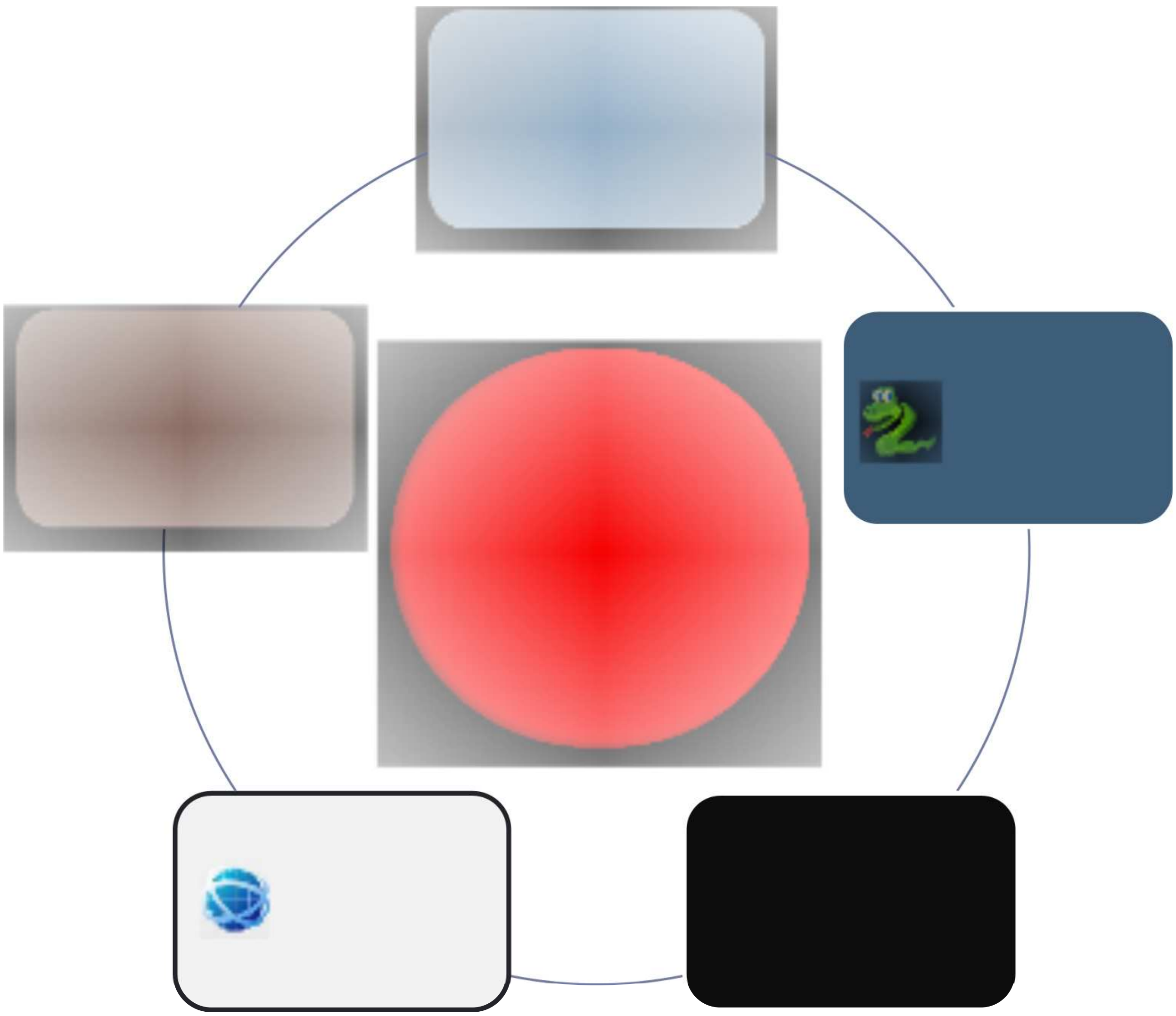

Figure 1: CCDB area of usage

# 2 Basic concepts

```
      SUBROUTINE REZEST_FDC_CDC(P, LAMBDA, M,
     X     DP_OVER_P, DPHI_TOT, DTHETA_TOT)
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
C
C This routine estimates the resolution in GlueX for charged particles
C in tranverse momentum, azimuthal angle, and polar angle.
C
C Input arguments, all REAL*4
C
C     P        Magnitude of total momentum (GeV/c)
C     LAMBDA   Dip angle, difference in polar angle in lab between track
C              and pi/2 (i. e., 90 degrees) (radians)
C     M        Mass of the particle (GeV/c^2)
C
C Output arguments, all REAL*4
C
C     DP_OVER_P  Relative resolution in transverse momentum
C                ("sigma_{p_t}/p_t")
C     DPHI_TOT   Resolution in azimuthal angle ("sigma_phi")
C     DTHETA_TOT Resolution in polar angle ("sigma_theta")
C
C The routine combines the measurements in the FDC and CDC where
C appropriate. Parameters describing the geometry and materials are
C defined in the routine REZEST_COMPONENTS which appears below.
C
```

## 2.1 Getting the code

Two methods:

1. Get the tar ball from

   `http://www.jlab.org/~marki/misc/rezest.tar`

2. Check it out from the subversion repository with the command

   `svn checkout https://halldsvn.jlab.org/repos/trunk/home/marki/gluex/rezest`

## 2.2 Building the files

There is a simple makefile in the directory:

```
> cd <rezest directory>
> make
gfortran -g   -c -o rezest.o rezest.F
gfortran -g   -c -o rezest_fdc_cdc.o rezest_fdc_cdc.F
ar rcv librezest.a rezest.o rezest_fdc_cdc.o
a - rezest.o
a - rezest_fdc_cdc.o
gfortran -g   -c -o rezest_point.o rezest_point.F
gfortran -o rezest_point rezest_point.o -L. -lrezest
gfortran -g   -c -o rezest_point_comp.o rezest_point_comp.F
gfortran -o rezest_point_comp rezest_point_comp.o -L. -lrezest
```

This creates three files that you care about:

1. `librezest.a`: the object library
2. `rezest_point`: a binary
3. `rezest_point_comp`: a binary

### 2.3 Using the files

## 3 Conclusions

The plots show reasonable agreement with the HDGEANT results. Agreement is generally at the 20% level, in some places better, in others as poor as a factor of 2.

One area where the simple model can breaks down is in the straight-line approximation for the trajectories for particles with very low transverse momentum. As a result predictions for extreme forward angles are suspect. We have already pointed out a problem with this approximation in estimating the contribution of curvature resolution to azimuthal angular resolution in Section **??**. Also since the measurement are assumed to be equally spaced in both the FDC and the CDC, some of the features in resolution visible in the transition polar angle region between the two detectors is not reproduced; the real detector does not have a smooth loss of CDC hits and a smooth gain of FDC hits as the polar angle moves forward as does the model used in the estimates.

The most profitable use of these routines is probably not in predicting the absolute level of resolutions in the detector, but in predicting relative changes in resolution as detector parameters are changed. The former requires a more detailed modeling of the detector but also requires a greater effort whenever a new design is proposed. This resolution estimator (`REZEST`) is useful in exploring the parameter space during the optimation process.

## A Some useful equations

## References