

# FastSim For STCF <sup>1</sup>

## User's Guide

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# Preface

## Some stuff

This FastSim now is just available on ui server @USTC. If you do not have an account, send email to [penghp@ustc.edu.cn](mailto:penghp@ustc.edu.cn).

## Structure of this guide

First chapter will give a brief introduction of STCF and FastSim of STCF. Second chapter shows the procedure of installation of FastSimAlg. Third chapter is about the usage.



# 1

## Introduction

This chapter is about introduction.  
This chapter is still empty.

### 1.1 STCF

### 1.2 FastSim of STCF



## 2

# Installing

The FastSim relies on BOSS software. It's easy to install it if you have experience with BOSS. Also user should have set your BOSS environment already.

### 2.1 Set environment

In "requirements" of "cmthome", **BEFORE** set your "workarea" add:

```
set STCF_DIST_AREA "/software/STCF"  
set STCF_RELEASE "stcf1.0.0/bes6.6.4.p01"1  
set STCFArea "${STCF_DIST_AREA}/${STCF_RELEASE}"  
path_remove CMLTPATH "/dist/"  
path_prepend CMLTPATH "${STCFArea}"
```

After modify "requirements", do the following things:

```
"cmt config"  
"source /software/BES/bes6.6.4.p01/setup.csh"2  
"source setup.csh"  
"source /software/STCF/stcf1.0.0/bes6.6.4.p01/stcfRelease/stcfRelease-  
00-00-01/cmt/setup.csh"
```

(You should put the last sentence in the .tcshrc file.)

Then you can check by "echo \$CMLTPATH". You will find stcf environment path in CMLTPATH:/software/STCF/stcf1.0.0

By "echo \$STCFFASTSIMALGROOT", you can see:

```
/software/STCF/stcf1.0.0/STCFastSimAlg/STCFastSimAlg-00-00-023
```

Then you have set environment of STCFastSim.

---

<sup>1</sup>here bes6.6.4.p01 is just an example. If there is no boss version you used, tell me.

<sup>2</sup>here 6.6.4.p01 is just an example.

<sup>3</sup>Or a higher version.

## 2.2 Add STCFastSimAlg in jobOption file

To use STCFastSimAlg, user just need to add some headfile in jobOption file.

```
#include "$STCFASTSIMALGROOT/share/jobOptions_fastSim.txt"
```

There are two examples:

```
/ustcfs/STCF/FastSim/share/runDst.txt
```

```
/ustcfs/STCF/FastSim/share/runRtraw.txt
```

# 3

## Details of usage

Due to simple simulation of STCFastSimAlg, not every function in BOSS can be gotten in STCFastSim. Most function related to physics will be accomplished. Until now, just part of them are achieved. And STCFastSimAlg provide interface to change the detector performance, which is one motivation of STCFastSimAlg. Details are shown following.

If functions you want to use are not available, send email to [wherenpc@mail.ustc.edu.cn](mailto:wherenpc@mail.ustc.edu.cn)

### 3.1 Some Important Information

Until now, both RecMdcTrack and RecKalMdcTrack are available. But if you don't need KinematicFit, please avoid using WTrackParameter and set NoHelix be true. (Because it will take more time to get Helix information from root file.)

To save running time, if you have known types of final particles, you can add following:

```
"STCFastSim.NoE = true;"  
"STCFastSim.NoMu = true;"  
"STCFastSim.NoPi = true;"  
"STCFastSim.NoK = true;"  
"STCFastSim.NoP = true;"  
"STCFastSim.NoChg = true;"
```

in the jobOptions file. Also if you don't need to do KinematicFit, add

```
"STCFastSim.NoHelix = true;"
```

If you don't need to get shower energy of charged tracks, add

```
"STCFastSim.NoEMC = true;"
```

If you don't need to get PID information of charged tracks, add

```
"STCFastSim.NoPID = true;"
```

When running FastSim, there is an input random seed, you need to assign this number for different jobs by:

```
"STCFastSim.RandomSeed = 11;"
```

(The default number is 10.)

## 3.2 Available Functions

### 3.2.1 Charged tracks

For charged tracks, following information have been simulated: track efficiency, helix parameter, PID, energy of shower in EMC.

#### Track Efficiency

Track efficiency are simulated. If you want to change track efficiency, add  
`"STCFastSim.chgRecEffScale=1.1;"`  
 in your "jobOptions.txt". Here the scale factor is the ratio of new efficiency to BESIII efficiency.

#### Momentum

Momentum resolution are simulated. If you want to change momentum resolution, add

```
"STCFastSim.chgRhoScale=0.7;"
"STCFastSim.chgPhiScale=0.7;"
"STCFastSim.chgTheScale=0.7;"
```

in your "jobOptions.txt". Here the scale factor is the ratio of new resolution to BESIII resolution. (Of course, these three scale factor could be different.)

#### Helix

Helix information are simulated. So user can do KinematicFit as same way in BOSS. Also 1C KinematicFit, KinematicFit for one miss track, second vertex fit for Ks can be performed.

The efficiency of KinematicFit is different with BESIII's. It's due to simple simulation of helix parameter.

#### PID

PID information are simulated.

Usage for PID are changed, user don't need to use same function in BESIII analysis. (When using STCFastSimAlg, old function of PID is meaningless.)

User can get the PID information directly by one member function of "RecMdcTrack": "stat()". If "stat() == 0"(or 1,2,3,4), this particle is identified as electron(or muon, pion, kaon, proton).

### **Shower Energy**

Shower created by charged track are simulated. But just energy, not position are simulated, user can get it same way in BESIII analysis.

Here all charged tracks "have" shower in EMC. If they shouldn't, the energy is 0.

### **3.2.2 Gamma**

For gamma, following information have been simulated: track efficiency, resolution.

#### **Track Efficiency**

Track efficiency are simulated. If you want to change track efficiency, add

```
"STCFastSim.gamRecEffScale=1.1;"
```

#### **Resolution**

Resolution are simulated. If you want to change gamma's resolution, add

```
"STCFastSim.gamEneScale=0.7;"
```

```
"STCFastSim.gamTheScale=0.7;"
```

```
"STCFastSim.gamPhiScale=0.7;"
```

in your "jobOptions.txt". Here the scale factor is the ratio of new resolution to BESIII resolution. (Of course, these three scale factor could be different.)

Here the gamma can be added in KinematicFit.