

Software feedback from Higgs/EW group

Junping Tian (U' of Tokyo)

ILD software & technical workshop, Apr. 24-27, 2017 @ Lyon

ongoing Higgs/EW analyses

WG conveners: Junping Tian, Graham Wilson

topic	comment	contact	institute
Higgs mass	$H \rightarrow bb$	A.Ebrahimi	DESY
Higgs CP	$H \rightarrow \tau \tau$	D.Jeans	U. Tokyo
Higgs CP	ttH	T.Ogawa	KEK
anomalous HVV couplings	ZH, vH	T.Ogawa	KEK
Higgs self-coupling	$HH \rightarrow bbbb$	C.Duerig	DESY
Higgs self-coupling	$HH \rightarrow bbWW^*$	M.Kurata	U. Tokyo
Higgs self-coupling	systematics, EFT	J.Tian	U. Tokyo
Higgs BRs	$H \rightarrow bb/cc/gg$	H.Ono	NDU
Higgs BRs	$H \rightarrow \mu \mu$	S.Kawada	DESY
Higgs BRs	$H \rightarrow WW^* \rightarrow 4q$	M.Panduravic	Vinca
Higgs BRs	$H \rightarrow$ invisible	Y.Kato	U. Tokyo
W mass	threshold / direct	G.Wilson	U. Kansas
W mass	single W	K.Cotera	DESY
TGC, polarimetry	WW	R. Karl	DESY
Z-pole running	ILC Parameters	G.Wilson	U. Kansas

news: hadronic recoil analysis, by Guillaume Garlliot (IPNL)

survey: software for analysis

(proposed/asked by Jenny)

- which ilcsoft tools are used in the analysis?
- where do you make a transition from Marlin to root?
(eg usage of LCTuple?)
- what works well, what is a pain?
- which tool / algorithm is missing?
- which collections in the DST are important for you?
- should anything be changed in the DST format for the next mass production?
- would you need the full SM background or can certain processes be omitted based on previous experience?
- any missing MC generator features for what you'd like to do?
- ...

survey: software for analysis

only 2 feedback received: Shin-ichi, Tomohisa

+ my personal observations

which ilcsoft tools are used in the analysis?

lepton finder: isolated lepton tagging/finder

tau reconstruction: TaJetFinder

jet clustering & flavor tagging: LCFI++

kinematic fitting: Marlinkinfit

overlay removal: kT in FastJet

event shape: thrust reconstruction, sphericity

PID: dEdx, cluster shape

where do you make a transition from Marlin to root?

mostly after primary information (lepton, photon, jet, flavor-tag) is obtained by marlin processors

LCTuple not often used

what works well, what is a pain?

Usually works well.

Shin-ichi:

But I feel really complicated to obtain correct relationship between PFO and MCParticle.

It should be documented how to deal with this kind of problem.

Tomohisa: No pain. I'm fine!

me:

ilcsoft (Marlin) provides a very friendly/flexible framework for analysis

which tool / algorithm is missing?

better performance c-tag

covariance matrix for neutral particle

well understood/tested PID (being developed)

ISR tag, isolated photon tag

color-singlet jet clustering

which collections in the DST are important for you?

Shin-ichi: mostly PandoraPFOs, MCParticlesSkimmed
sometimes Track, Cluster

Tomohisa: Everything is important depending on the
analysis target

should anything be changed in the DST format for the next mass production?

not really

might be useful to add TruthJet (all truth primary particle at parton level) collection

side remark by Tomohisa: for SGV DST, energy depositions in calorimeters are missing

would you need the full SM background or can certain processes be omitted based on previous experience?

in principle yes

for individual analysis, mostly not, but need to understand background very well

however, needed background differ analysis by analysis

so in the end, full SM background should be commonly provided, with high statistics

any missing MC generator features for what you'd like to do?

a general parton showering algorithm: was a pain for $e^+e^- \rightarrow H^+H^- \rightarrow t\bar{t}b\bar{b} \rightarrow 8\text{-fermion}$

for systematics study: alternatives to pythia for hadronisation

remark: other than Whizard, Physsim has been used for many analyses as well