Jet Energy Resolution
of ILD models

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Contents

I compared the behavior about following items in ILD_l4(s4)_v02.

using Z→uds samples (10k events / each energy)

check polar angle dependence

☐single jet energy resolution (2 jet clustering)
  ○at MC truth level
  ○at reconstructed level

☐total (2 jet) energy resolution

☐calculated jet energy resolution

using ffH, H→ZZ→4ν samples (10k events / eL.pR, eR.pL)

☐H→inv. recoil mass resolution

Setting

- ILCSoft : v01-19-04 (gcc49)

- ILD models : ILD_l4_v02 , ILD_s4_v02

- Z→uds samples
  - ◦ $\sqrt{s}$ = [30,40,60,91,120,160,200,240,300,350,400,500] GeV
  - ◦ 10k events each
  - ◦ jet energy resolution is obtained by dividing RMS_{90} by $mean_{90}$ of E
  - ◆ single jet (jet1 + jet2)
    - ◦ MC : initial particle: quark → jet1, anti-quark → jet2
    - ◦ REC : 2 jet clustering using LCFIPlus
  - ◆ total
    - ◦ sum up jet1 energy & jet2 energy (E_{jj})
  - ◆ calculated
    - ◦ obtain single jet energy resolution from total energy resolution by multiplying by $\sqrt{2}$

- ffH, H→ZZ→4ν samples
  - ◦ $\sqrt{s}$ = 250 GeV
  - ◦ 10k events each polarization
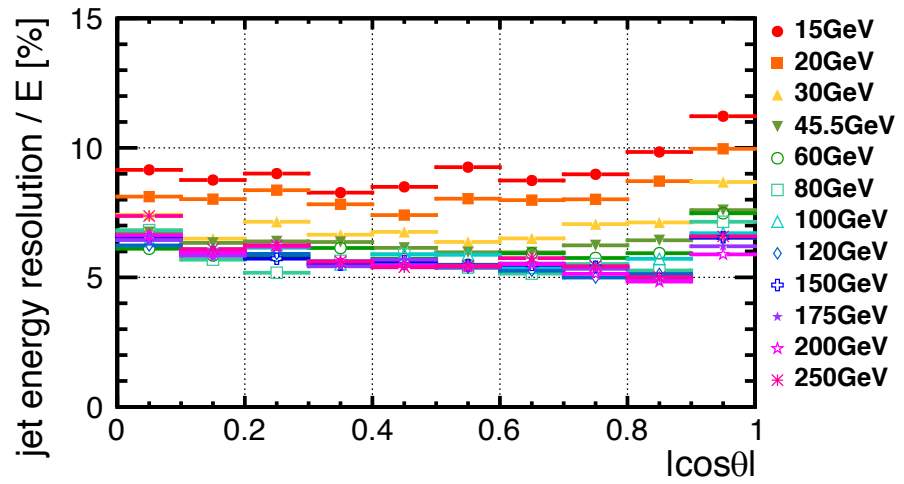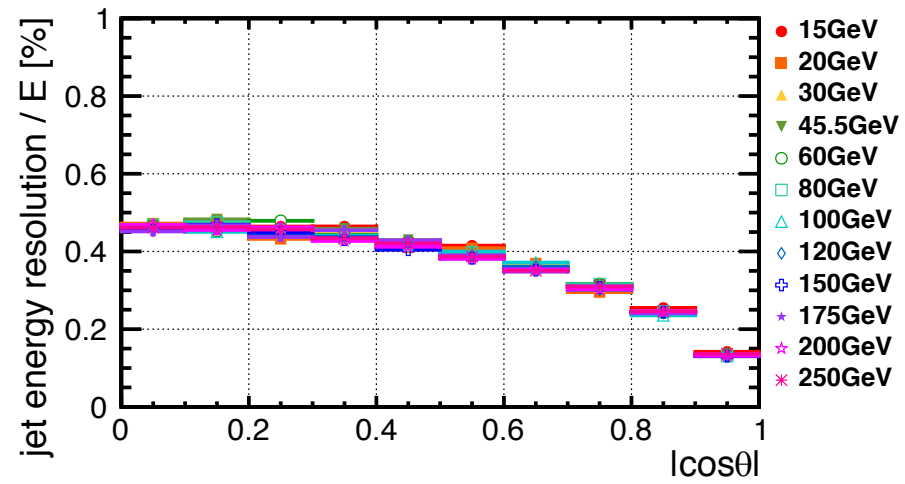
single jet energy resolution
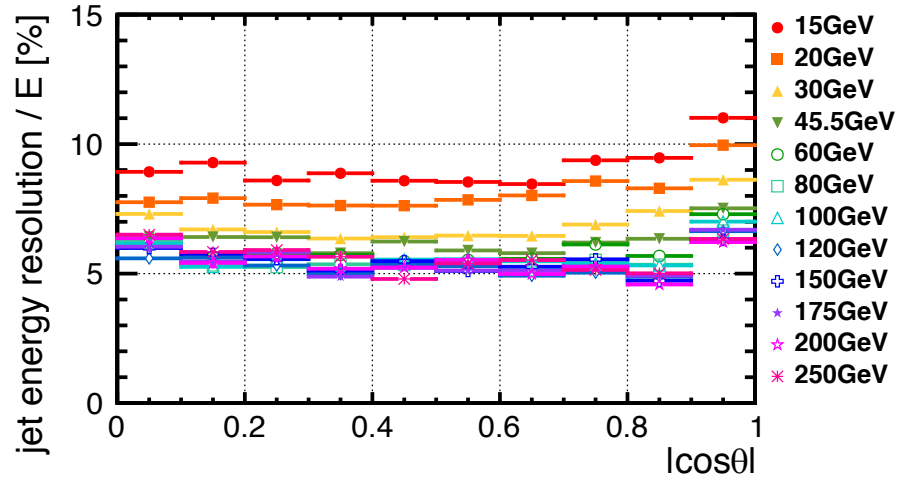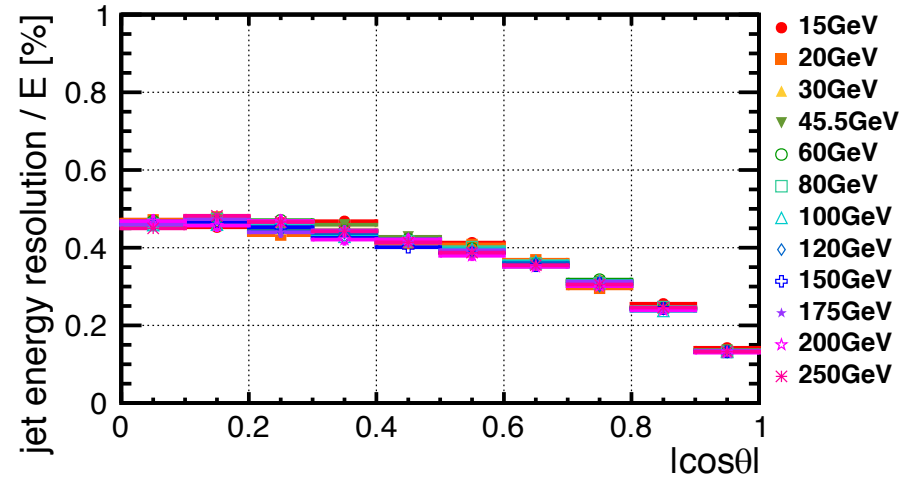
total energy resolution
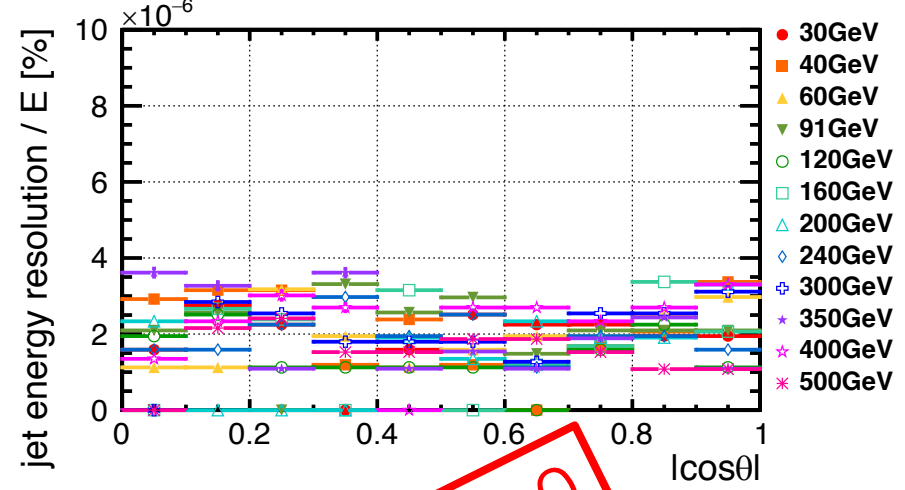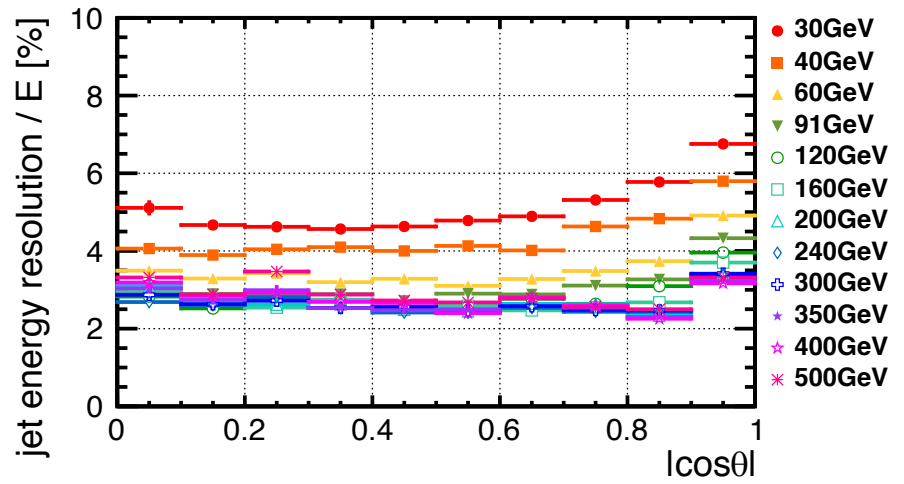

dijet ILD_l4_v02 REC
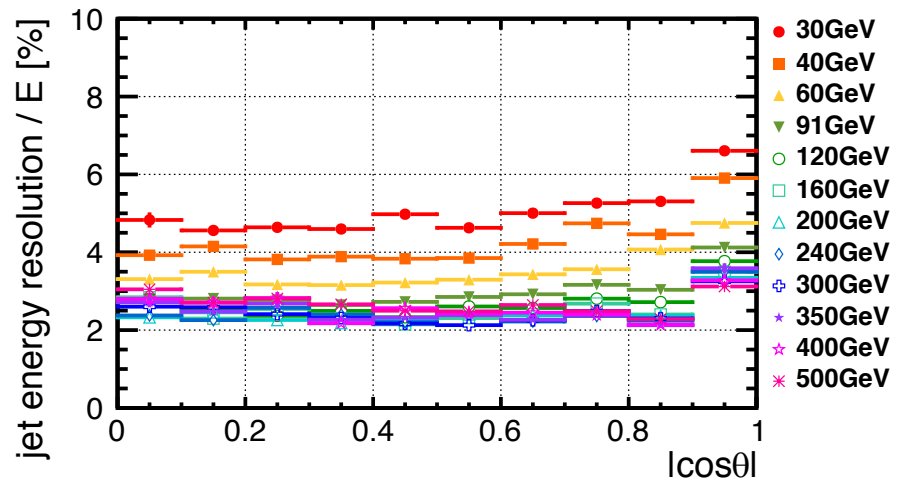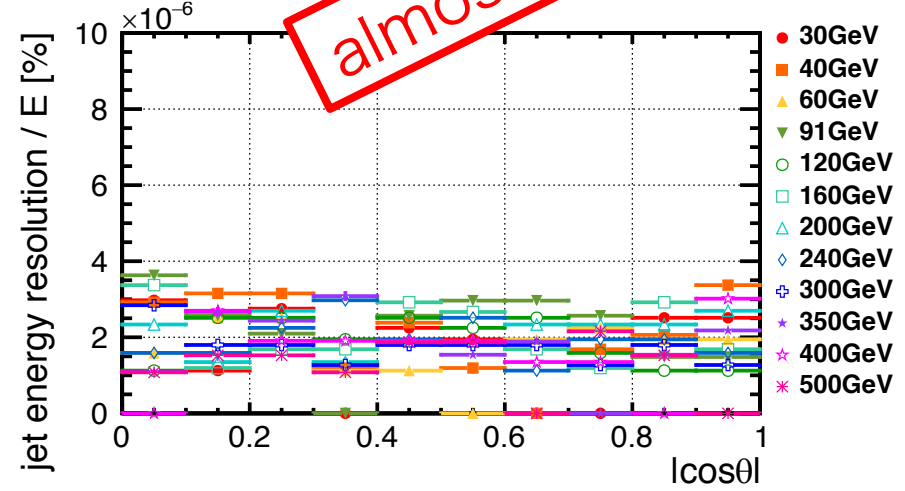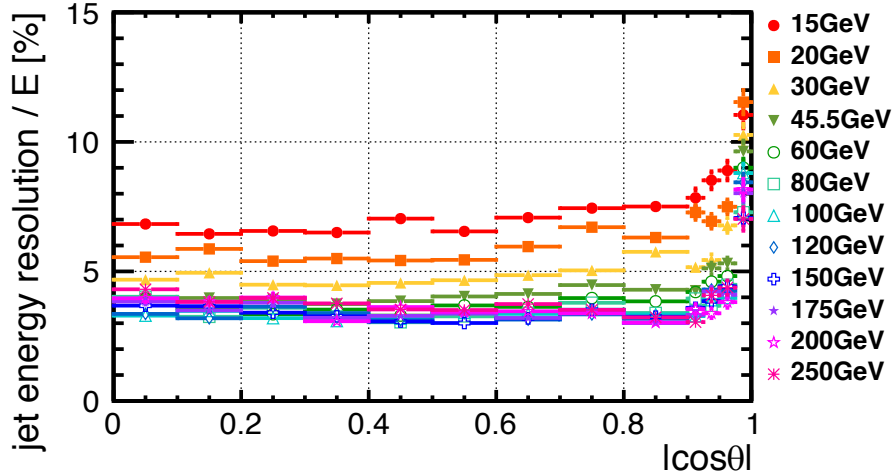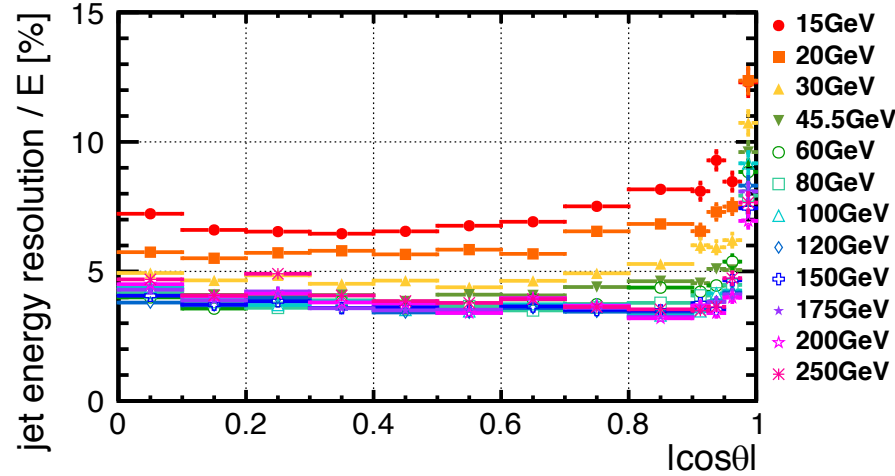
dijet ILD_l4_v02 MC

dijet ILD_s4_v02 REC

dijet ILD_s4_v02 MC

almost 0

calculated jet energy resolution

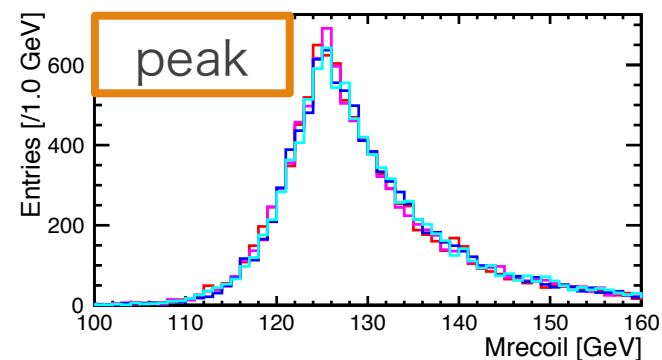**single_precise ILD_l4_v02 REC**

single_precise ILD_s4_v02 REC

H→inv. recoil mass resolution

whole

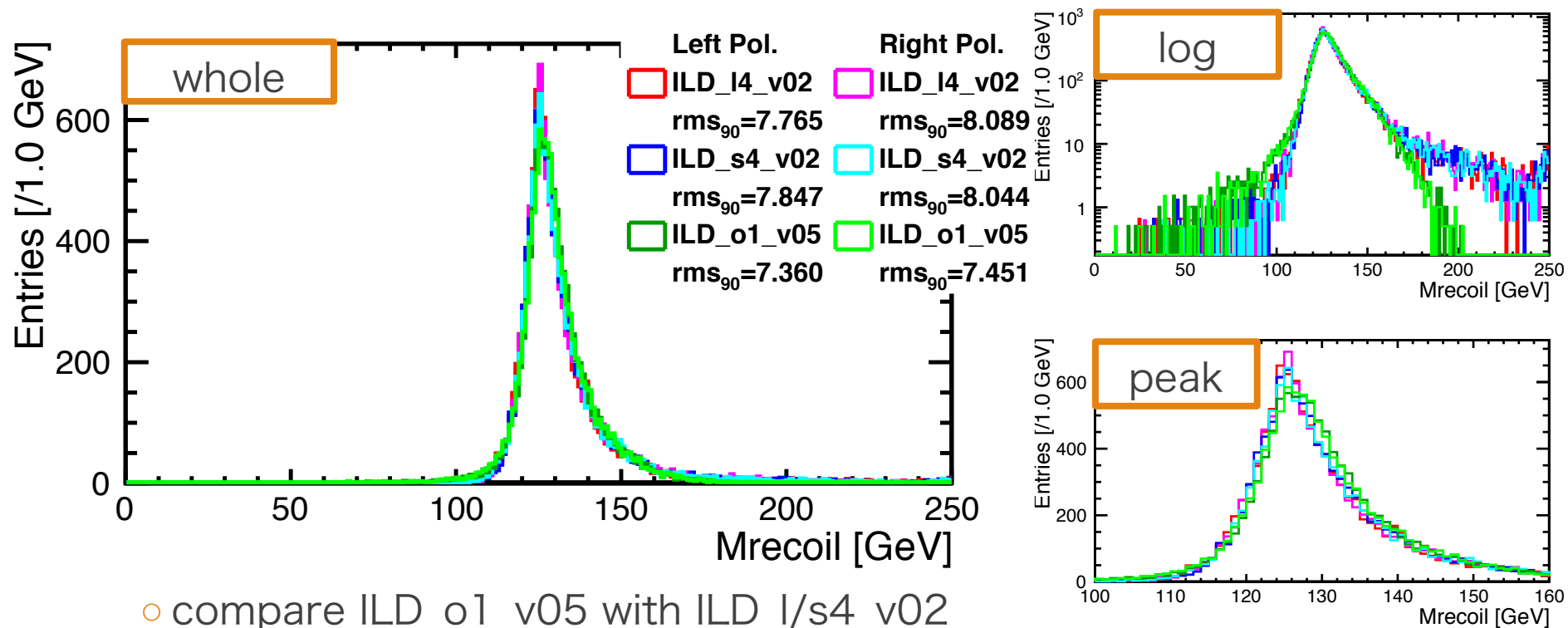|	Left Pol.	Right Pol.
	ILD_l4_v02	ILD_l4_v02
	$rms_{90}=7.765$	$rms_{90}=8.089$
	ILD_s4_v02	ILD_s4_v02
	$rms_{90}=7.847$	$rms_{90}=8.044$

log

peak
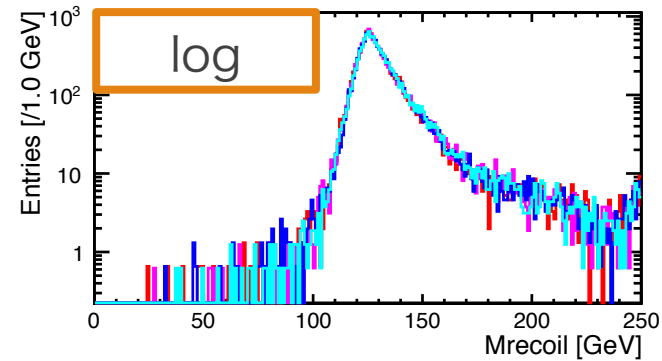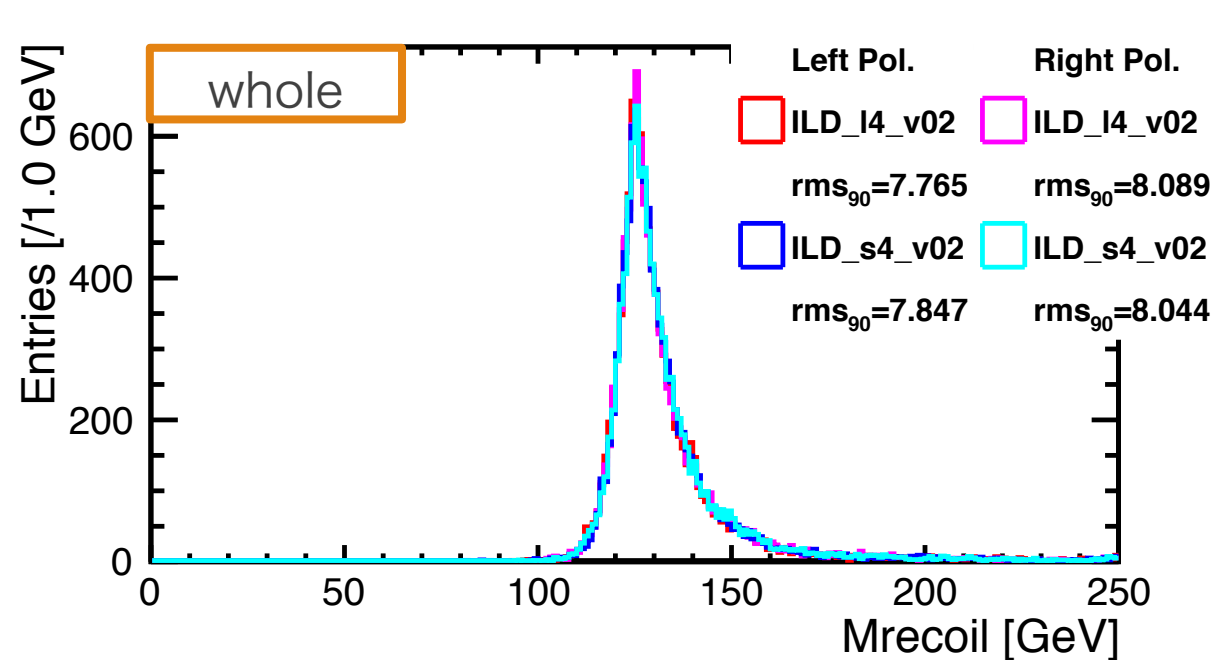
○ specified range [0:250] for rms_{90}
○ there is slight tail in high mass end

Backup

H→inv. recoil mass resolution

whole

Left Pol.	Right Pol.
ILD_l4_v02	ILD_l4_v02
$rms_{90}=7.765$	$rms_{90}=8.089$
ILD_s4_v02	ILD_s4_v02
$rms_{90}=7.847$	$rms_{90}=8.044$
ILD_o1_v05	ILD_o1_v05
$rms_{90}=7.360$	$rms_{90}=7.451$

log

peak

○ compare ILD_o1_v05 with ILD_l/s4_v02
○ ILD_o1_v05 sample is generated by Junping
   (/hsm/ilc/grid/storm/user/t/tjunping/data/slcio/E250_overlay/Dirac-Sim-E250-qqh_zz_4n.*.slcio)
○ specified range [0:250] for rms_{90}
○ l/s4 has slight tail in high mass end
○ l/s4 is sharper than o1 at the peak region

sv01-19-04_lcgeo.mILD_l4_v02