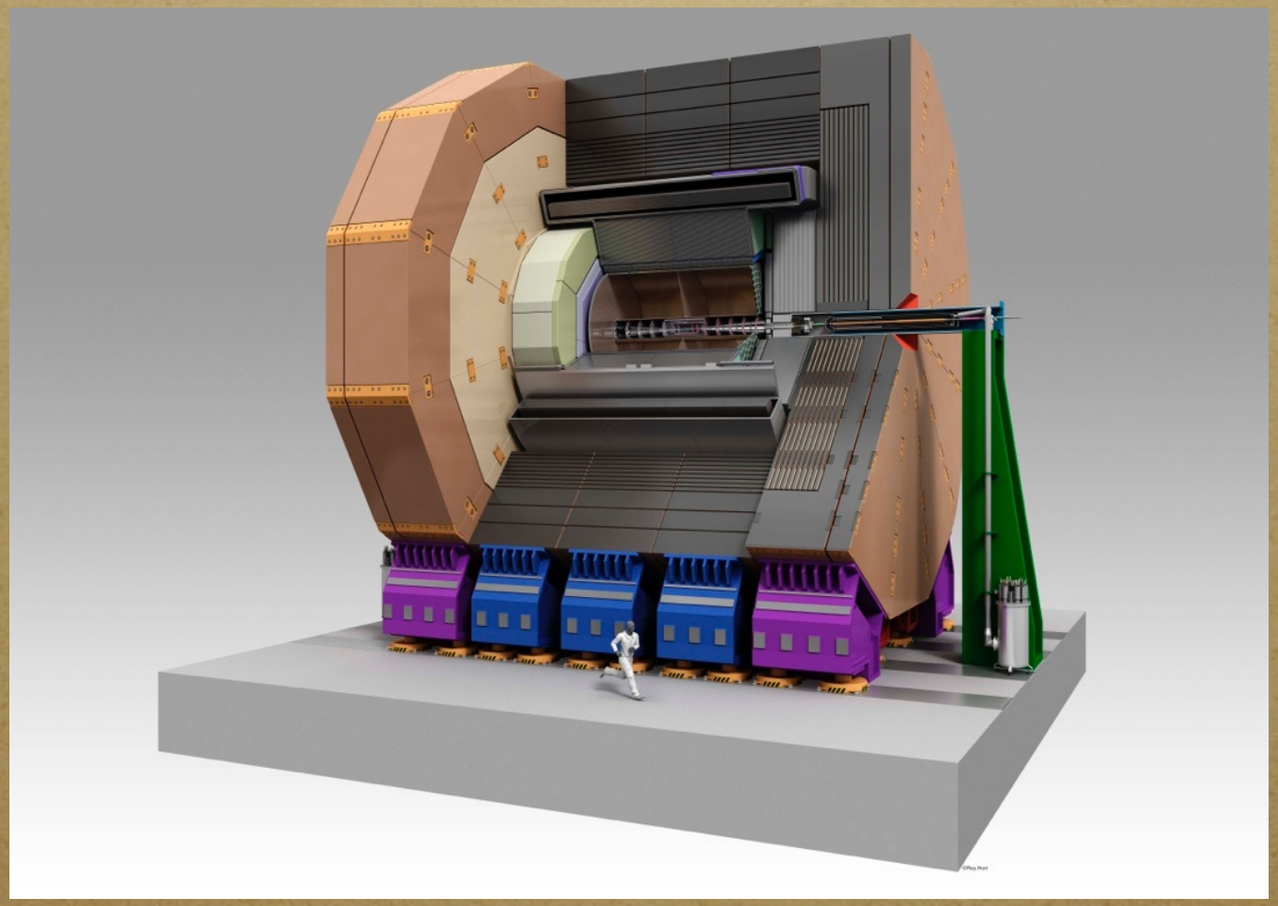
Physics Analyses in ILD: status and outlook



Jenny List (DESY), Keisuke Fujii (KEK), Junping Tian (KEK)

LCWS15, Nov. 2-6 @ Whistler, B.C., Canada

the physics analysis working group in ILD is very active...

Analysis Contact	email	supervisor/collaborator	institute	Topic	ECM	Full / Fast	Status	last present.	Asian meeting	Comment
ILD Physics and Detector Optimisation Studies										
Physics Analyses										
Abhinav Dubey	abhinav@epx.phys.tohoku.ac.jp		Tohoku	Heavy Higgs search (Neutral)	500/1000	Full Sim	abandonned	Jan-07	Feb-06	e+e- ? HA ? 4b
Akimasa Ishikawa	akimasa@epx.phys.tohoku.ac.jp		Tohoku	H-->Invisible	250 /350 / 500	Full Sim	almost done	Nov-19		almost done
Alexey Drutskoy	Drutskoy@itep.ru		ITEP	H->tautau CP	?	planned	?			
Ali Ebrahimi	aliakbar.ebrahimi@desy.de	JL	DESY	Higgs mass from H->bb	500	Full Sim	just started			
Brian van Doren			Kansas U	?						
Claude Duerig	claude.duerig@desy.de	JL	DESY	ee->ZHH, 2x H->bb	500	FullSim	ongoing	Nov-26		Kinfit, ME, Jet Finding
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tokyo	H->tautau CP	500	FullSim	ongoing		Dec 12	Kinfit, angular reco
Davide Mellini		Marcel Vos / LAL	IFIC	ttH	600 !	?	planned			currently working on ttH at ATLAS
Emi Kou		Francois LeDiberder	LAL	HO ew corrections ttbar prod		Pheno	ongoing			Whizard / Madgraph interface...?
Felix Mueller	felix.johannes.mueller@desy.de	JL	DESY	ee-> nunu H, BRs & ZH/WW	350	FullSim	almost done	Nov-26		
Graham Wilson			Kansus U	W mass measurement	161/350/500	?				
Hale Sert	hale.sert@desy.de	JL	DESY	Light Higgsinos, dM <= 1 GeV	500	SGV & FullSim	ongoing	Oct 22		has to hand-in thesis in early 2015
Hiroaki Ono	ono@ngt.ndu.ac.jp	Akiya	NDU	Higgs BR, Z->ll,qq	250/350	FullSim	ongoing			H-->bb,cc,gg & H-->WW*, updating with mH=125GeV
Jacqueline Yan	rinrin84@gmail.com	Daniel Jenas	Tokyo	Higgs leptonic recoil	350	FullSim	ongoing		Mar 13	comparison with 250 GeV, next focus on mass
Junping Tian	tianjp@post.kek.jp	Keisuke/Claude/Jenny	KEK	ee->vvHH, 2x H-->bb	1000	Full Sim	almost	Feb-18	Feb-20	need be updated to mH=125GeV, being considered as one early publication
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	vvH with H-->bb, WW*, ZZ*	500	Full Sim	almost			For total width study, only full hadronic decay of ZZ* remains to be done
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	H->invis Z-> leptonic	500	Full Sim	done			For total width study, only full hadronic decay of ZZ* remains to be done
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	ZZ-fusion production eeH	500	Full Sim	ongoing			H-->bb done, going to explore anomalous HZZ coupling, particularly CP violation effect
Koya Tsuchimoto	tsuchimoto@azusa.shinshu-u.ac.jp	Katsushige	Shinshu	single W process, W mass and TGC	250/500	Full Sim	ongoing	Jan-21	Feb-27	motivated by impact of ScECAL on JER, going to be a master project
Madalina Chera	madalina.chera@desy.de	JL	DESY	SUSY Point 5 chi->Z/W->qq	500	FullSim & SGV	ongoing	Feb-18		Comparison LoI, DBD, SGV
Marça Boronat		Marcel Vos / LAL	IFIC	top mass in continuum	500	Gen. Level	ongoing			new method, ~ 6 months
Marcel Vos			IFIC	top couplings	500	FullSim	ongoing			Jet finding
Mark Thomson	thomson@hep.phy.cam.ac.uk		Cambridge	Higgs hadronic recoil & invis	250/500	FullSim	done			
Mark Thomson	thomson@hep.phy.cam.ac.uk		Cambridge	Higgs hadronic recoil & invis	350	FullSim	done	Oshu		publication in prep
Martin Perelló		Marcel Vos / LAL	IFIC	single top, A_FB at threshold	350	FullSim	ongoing			take over from Nacho
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp		Tokyo	ZHH, HH->WWbb	500	FullSim	ongoing		Feb-27	PID, jet pairing, kin fit!
Mikael Berggren	mikael.berggren@desy.de		DESY	Sleptons, reco and disc. reach	500/ ...	SGV	ongoing	Dec 10		incl. selectrons from S.Caiazza
Moritz Habermehl	moritz.habermehl@desy.de	JL	DESY	modelindep WIMPs	350/500	FullSIm & extrap	starting	Nov-19		Taking over from A.Chaus, focus on systematics
Nacho Garcia		Marcel Vos / LAL	IFIC	top quark couplings to gamma and Z	500	FullSim	almost done	Dec 10		arXiv
PhD MPI			MPI	tbd						
Postdoc MPI			MPI	tbd						
Rashid Mehdiyev	Rashid.Mehdiyev@carleton.ca	Alain Bellerive	Carleton	H->mumu	350/500	SGV	starting			
Shin-ichi Kawada	s-kawada@huhep.org	Taikan / Tomohiko	Hiroshima	H-->tautau	250/500	Full Sim	almost	Nov-19	Feb-06	updating with mH=125 GeV
Shun Watanuki	watanuki@epx.phys.tohoku.ac.jp	Jan	Tohoku	CP mixture in leptonic recoil	250	FullSim	ongoing	Nov-05		Fitting techniques, systematic error of mass, CP
Shun Watanuki	watanuki@epx.phys.tohoku.ac.jp	Jan	Tohoku	Higgs recoil mass	250	FullSim	done	Nov-05		Fitting techniques, systematic error of mass, CP
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL	top couplings	500	FullSIm	ongoing			title of thesis: "Top quark production at the ILC and optimisation of Particle Flow Algorithm
Takuaki Mori	takuaki@icepp.s.u-tokyo.ac.jp	Tomohiko	Tokyo	Radiative Natural SUSY benchmark	500	Fast/FullSim	starting			input for gaugino mass unification plot
Tatsuhiko Tomita	tomita@epp.phys.kyushu-u.ac.jp	Taikan	Kyushu	Higgs hadronic recoil	250 / 350 ?	FullSim	ongoing	Mar 4		ISR tagging, cut opt for model independency / LEAVING?
Tino Calancha	calancha@post.kek.jp	Akiya	KEK	H-->mumu, H-->gam gam	250/500/1000	Full Sim	ongoing		Feb-20	now mainly on H-->gam gam at 250 GeV, and H-->mumu at 250 and 500 GeV
Tomohiko Tanabe	tomohiko@icepp.s.u-tokyo.ac.jp		Tokyo	electroweakino scan	500	SGV	ongoing			need scan points
Tomohisa Ogawa	ogawat@post.kek.jp	Junping / Keisuke	KEK	Higgs recoil mass	250/350	SGV	ongoing			PhD project
Tomohisa Ogawa	ogawat@post.kek.jp	Junping / Keisuke	KEK	anomalous HVV coupling	?	Physsim?	ongoing		Mar 13	PhD project
Yorgos Voutsinas	georgios.voutsinas@desy.de	JL/FG	DESY	Light Higgsinos, dM <= 1 GeV	500	FullSim	starting			Taking over from Hale, focussing on VXD requirements
Yuji Sudo	sudo@phys.kyushu-u.ac.jp	Taikan	Kyushu	ttH	500	FullSim	ongoing			looking at systematics, cut opt / MVA
Yuko Shinzaki	shinzaki@epx.phys.tohoku.ac.jp	Jan / Akimasa	Tohoku	Charged Higgs search	250	Full Sim	ongoing		Jan-15	e+e- ? WH ? W(WZ) / GONE TO INDUSTRY
Trong Hieu	trong.hieu.tran@llr.in2p3.fr	Vincent Boudry	LLR	tau reconstruction in ee->Z->tau tau		Full Sim	ongoing			
Imad Laktineh	imad.baptiste.laktineh@cern.ch		Lyon	ZZ, WW production	?	?	planned			SDHCal
Imad Laktineh	imad.baptiste.laktineh@cern.ch		Lyon	ee->ZH->fully hadronic	?	?	planned			SDHCal
Detector Optimisation										
Benjamin Boitrelle	benjamin.boitrelle@desy.de	IM Gregor	DESY	VXD time/point res optimisation	350	FullSim	starting			Physics benchmark: H->ccbar
Dan Yu	dan.yu@llr.in2p3.fr	Vincent Boudry	LLR	ECAL optimization		Full Sim	ongoing			
Hiroki Sumida		Taikan	Kyushu	Ecal Layer Opt		Full Sim	ongoing	Jan-14		
Mikael Berggren	mikael.berggren@desy.de	JL	DESY	Tracker optimisation		SGV	ongoing	Feb-11		
Sergei Schuwalow			DESY	FCal Opt				Jan-07		
Steven Green		Mark Thomson	Cambridge	HCal optimisation		FullSim	ongoing	Jan-14		
Tino Calancha	calancha@post.kek.jp	Akiya	KEK	photon energy resolution, momentum resolution	500/1000	Full Sim	ongoing			Physics benchmark: H->gammagamma, H-->mumu
Tomohisa Ogawa	ogawat@post.kek.jp	Junping / Keisuke	KEK	SiW vs SciW ECAL, TPC radius	250/350	Full Sim / SGV	almost done	Nov-12		Physics benchmark: H->invisible, leptonic recoil with various TPC radius (SGV); continue
Yorgos Voutsinas	georgios.voutsinas@desy.de	JL/FG	DESY	VXD time/point res optimisation	500	FullSim	starting			Physics benchmark: light Higgsinos
Reconstruction & Analysis Tools										
Bo Li		Keisuke	Tsinghua	KalTest		FullSim	ongoing	Jan-21		inhomogeneous B-Field
Brian van Doren		Graham	Kansas U	pi0 reconstruction		FullSIm	ongoing			application: eg Higgs mass reco
		Frank Gaede	DESY	aidaTT tracking		FullSim	ongoing	Nov-05		
Dan Yu	dan.yu@llr.in2p3.fr	Vincent Boudry	LLR	Particle ID development		Full Sim	ongoing			
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tokyo	Garlic		FullSim	maintenance			
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tokyo	tau fitting		FullSim	maintenance			
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tokyo	pi0 reconstruction		FullSim	ongoing	Jan-07		
Eldwan Brianne	eldwan.brianne@desy.de	MB	DESY	Particle Flow in SGV		FullSim & SGV	ongoing			paused due to Calice testbeam
Frank Gaede			DESY	DD4HEP		FullSim	ongoing	Nov-05		
Hale Sert	hale.sert@desy.de	JL	DESY	mu/pi separation for E<2 GeV	500	FullSim	done	Mar 4		has to hand-in thesis in early 2015
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	matrix element package (physsim)		Full Sim	ongoing			implement major LCME class in SM, support anomalous coupling, more development on c
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	overlay removal, seed based	1 TeV	Full Sim	ongoing		Feb-06	for nunuHH at 1TeV
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	realistic color singlet jet clustering		Full Sim	ongoing			Mini-jet based, incorporating new Geogi Algorithm
Marcel Vos	marcel.vos@cern.ch		IFIC	systematic uncertainties			just started	Feb-11		
Mark Thomson		NN? Masakazu???	Cambridge	Pandora PFA		FullSIm	maintenance			
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp		Tokyo	dE/dx and Calo PiD	500	FullSim	ongoing	Oct 1		physics benchmark:ZHH
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp	Tomohiko/ Taikan / Jan	Tokyo	LCFI			ongoing			
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp		Tokyo	vertex charge, pi0 attach	500	FullSim	ongoing			physics benchmark:ZHH, tt
Mikael Berggren	mikael.berggren@desy.de		DESY	Colour Singlet Truth Jet Finder			done	Oct 1		will be in next release, physics appl: ZHH ADAPT TO HIGGS SAMPLES
Mikael Berggren	mikael.berggren@desy.de		DESY	SGV Maintenance		SGV	stable			several improvements in pipeline
Moritz Habermehl	moritz.habermehl@desy.de	MB	DESY	Whizard 2 comissioning			ongoing			new GuineaPig interface, physics appl: WIMPs
Nacho Garcia		Marcel Vos / LAL	IFIC	Jet reconstruction	500	FullSim	ongoing			application: top couplings
Shaojun Lu		Tlno Calancha	DESY/KEK	MC Production				Feb-04		
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL	b jet charge	500	FullSIm	ongoing	Feb-11		application: top couplings
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL	Matrix element method	500	FullSIm	plan			application: top couplings
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL	PFA development		FullSIm	plan			improving PandoraPFA
Taikan Suehara	suehara@phys.kyushu-u.ac.jp	Shin-ichi	Kyushu	tau finder	250/500	Full Sim	almost			optimization
Tino Calancha	calancha@post.kek.jp	Akiya	KEK	Covarince matrix of four momentum, event by event mass resolution		Full Sim	ongoing			done for charged track in H-->mumu, can start for H-->gam gam
Yorgos Voutsinas	georgios.voutsinas@desy.de	FG	DESY	mini-vector tracking in VDX/SIT		FullSim	nearly done			
Yorgos Voutsinas	georgios.voutsinas@desy.de	FG	DESY	ILD Performance		FullSim	ongoing	Feb-18		
	PFA -> write email to Mark									

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ILD Physics and Detector Optimisation Studies										
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Alexey Drutskoy	Drutskoy@itep.ru		ITEP	H->tautau CP	?	?	planned			
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Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tokyo	H->tautau CP	500	FullSim	ongoing		Dec 12	Kinfit, angular reco
Davide Mellini		Marcel Vos / LAL	IFIC	ttH	600 !	?	planned			currently working on ttH at ATLAS
Emi Kou		Francois LeDiberder	LAL	HO ew corrections ttbar prod		Pheno	ongoing			Whizard / Madgraph interface…?
Felix Mueller	felix.johannes.mueller@desy.de	JL	DESY	ee-> nunu H, BRs & ZH/WW	350	FullSim	almost done	Nov-26		
Graham Wilson			Kansus U	W mass measurement	161/350/500	?				
Hale Sert	hale.sert@desy.de	JL	DESY	Light Higgsinos, dM <= 1 GeV	500	SGV & FullSim	ongoing	Oct 22		has to hand-in thesis in early 2015
Hiroaki Ono	ono@ngt.ndu.ac.jp	Akiya	NDU	Higgs BR, Z->ll,qq	250/350	FullSim	ongoing			H-->bb,cc,gg & H-->WW*, updating with mH=125GeV
Jacqueline Yan	rinrin84@gmail.com	Daniel Jenas	Tokyo	Higgs leptonic recoil	350	FullSim	ongoing		Mar 13	comparison with 250 GeV, next focus on mass
Junping Tian	tianjp@post.kek.jp	Keisuke/Claude/Jenny	KEK	ee->vvHH, 2x H-->bb	1000	Full Sim	almost	Feb-18	Feb-20	need be updated to mH=125GeV, being considered as one early publication
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Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	H->invis Z-> leptonic	500	Full Sim	done			For total width study, only full hadronic decay of ZZ* remains to be done
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	ZZ-fusion production eeH	500	Full Sim	ongoing			H-->bb done, going to explore anomalous HZZ coupling, particularly CP violation effect
Koya Tsuchimoto	tsuchimoto@azusa.shinshu-u.ac.jp	Katsushige	Shinshu	single W process, W mass and TGC	250/500	Full Sim	ongoing	Jan-21	Feb-27	motivated by impact of ScECAL on JER, going to be a master project
Madalina Chera	madalina.chera@desy.de	JL	DES							Comparison LoI, DBD, SGV
Marça Boronat		Marcel Vos / LAL	IFIC							new method, ~ 6 months
Marcel Vos			IFIC							Jet finding
Mark Thomson	thomson@hep.phy.cam.ac.uk		Car							
Mark Thomson	thomson@hep.phy.cam.ac.uk		Car							publication in prep
Martin Perelló		Marcel Vos / LAL	IFIC							take over from Nacho
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp		Tok							PID, jet pairing, kin fit!
Mikael Berggren	mikael.berggren@desy.de		DES							incl. selectrons from S.Caiazza
Moritz Habermehl	moritz.habermehl@desy.de	JL	DES							Taking over from A.Chaus, focus on systematics
Nacho Garcia		Marcel Vos / LAL	IFIC							arXiv
PhD MPI			MPI							
Postdoc MPI			MPI							
Rashid Mehdiyev	Rashid.Mehdiyev@carleton.ca	Alain Bellerive	Car							
Shin-ichi Kawada	s-kawada@huhep.org	Taikan / Tomohiko	Hiro							updating with mH=125 GeV
Shun Watanuki	watanuki@epx.phys.tohoku.ac.jp	Jan	Toh							Fitting techniques, systematic error of mass, CP
Shun Watanuki	watanuki@epx.phys.tohoku.ac.jp	Jan	Toh							Fitting techniques, systematic error of mass, CP
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL							title of thesis: "Top quark production at the ILC and optimisation of Particle Flow Algorithm
Takuaki Mori	takuaki@icepp.s.u-tokyo.ac.jp	Tomohiko	Tok							input for gaugino mass unification plot
Tatsuhiko Tomita	tomita@epp.phys.kyushu-u.ac.jp	Taikan	Kyu							ISR tagging, cut opt for model independency / LEAVING?
Tino Calancha	calancha@post.kek.jp	Akiya	KEK							now mainly on H-->gam gam at 250 GeV, and H-->mumu at 250 and 500 GeV
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Trong Hieu	trong.hieu.tran@llr.in2p3.fr	Vincent Boudry	LLR							
Imad Laktineh	imad.baptiste.laktineh@cern.ch		Lyo							SDHCal
Imad Laktineh	imad.baptiste.laktineh@cern.ch		Lyo							SDHCal
Detector Optimisation										
Benjamin Boitrelle	benjamin.boitrelle@desy.de	IM Gregor	DES							Physics benchmark: H->ccbar
Dan Yu	dan.yu@llr.in2p3.fr	Vincent Boudry	LLR							
Hiroki Sumida		Taikan	Kyu							
Mikael Berggren	mikael.berggren@desy.de	JL	DES							
Sergei Schuwalow			DES							
Steven Green		Mark Thomson	Car							
Tino Calancha	calancha@post.kek.jp	Akiya	KEK							Physics benchmark: H->gammagamma, H-->mumu
Tomohisa Ogawa	ogawat@post.kek.jp	Junping / Keisuke	KEK							Physics benchmark: H->invisible, leptonic recoil with various TPC radius (SGV); continue
Yorgos Voutsinas	georgios.voutsinas@desy.de	JL/FG	DES							Physics benchmark: light Higgsinos
Reconstruction & Analysis Tools										
Bo Li		Keisuke	Tsin							inhomogeneous B-Field
Brian van Doren		Graham	Kan							application: eg Higgs mass reco
		Frank Gaede	DES							
Dan Yu	dan.yu@llr.in2p3.fr	Vincent Boudry	LLR							
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tok							
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tok							
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tok							
Eldwan Brianne	eldwan.brianne@desy.de	MB	DES							paused due to Calice testbeam
Frank Gaede			DES							
Hale Sert	hale.sert@desy.de	JL	DES							has to hand-in thesis in early 2015
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK							implement major LCME class in SM, support anomalous coupling, more development on
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK							for nunuHH at 1TeV
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK							Mini-jet based, incorporating new Geogi Algorithm
Marcel Vos	marcel.vos@cern.ch		IFIC							
Mark Thomson		NN? Masakazu???	Car							
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp		Tok							physics benchmark:ZHH
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp	Tomohiko/ Taikan / Jan	Tok							
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp		Tok							physics benchmark:ZHH, tt
Mikael Berggren	mikael.berggren@desy.de		DES							will be in next release, physics appl: ZHH ADAPT TO HIGGS SAMPLES
Mikael Berggren	mikael.berggren@desy.de		DESY	SGV Maintenance		SGV	stable			several improvements in pipeline
Moritz Habermehl	moritz.habermehl@desy.de	MB	DESY	Whizard 2 comissioning			ongoing			new GuineaPig interface, physics appl: WIMPs
Nacho Garcia		Marcel Vos / LAL	IFIC	Jet reconstruction	500	FullSim	ongoing			application: top couplings
Shaojun Lu		TIno Calancha	DESY/KEK	MC Production				Feb-04		
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL	b jet charge	500	FullSIm	ongoing	Feb-11		application: top couplings
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL	Matrix element method	500	FullSIm	plan			application: top couplings
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL	PFA development		FullSIm	plan			improving PandoraPFA
Taikan Suehara	suehara@phys.kyushu-u.ac.jp	Shin-ichi	Kyushu	tau finder	250/500	Full Sim	almost			optimization
Tino Calancha	calancha@post.kek.jp	Akiya	KEK	Covarince matrix of four momentum, event by event mass resolution		Full Sim	ongoing			done for charged track in H-->mumu, can start for H-->gam gam
Yorgos Voutsinas	georgios.voutsinas@desy.de	FG	DESY	mini-vector tracking in VDX/SIT		FullSim	nearly done			
Yorgos Voutsinas	georgios.voutsinas@desy.de	FG	DESY	ILD Performance		FullSim	ongoing	Feb-18		
	PFA -> write email to Mark									

47 physics analyses

+

9 det. opt. analyses

+

29 analyses on tools

the physics analysis working group in ILD is very active…

ILD Physics and Detector Optimisation Studies										
Analysis Contact	**email**	**supervisor/collaborator**	**institute**	**Topic**	**ECM**	**Full / Fast**	**Status**	**last present.**	**Asian meeting**	**Comment**
Physics Analyses										
Abhinav Dubey	abhinav@epx.phys.tohoku.ac.jp		Tohoku	Heavy Higgs search (Neutral)	500/1000	Full Sim	abandonned	Jan-07	Feb-06	e+e- ? HA ? 4b
Akimasa Ishikawa	akimasa@epx.phys.tohoku.ac.jp		Tohoku	H-->Invisible	250 /350 / 500	Full Sim	almost done	Nov-19		almost done
Alexey Drutskoy	Drutskoy@itep.ru		ITEP	H->tautau CP	?	?	planned			
Ali Ebrahimi	aliakbar.ebrahimi@desy.de	JL	DESY	Higgs mass from H->bb	500	Full Sim	just started			
Brian van Doren			Kansas U	?						
Claude Duerig	claude.duerig@desy.de	JL	DESY	ee->ZHH, 2x H->bb	500	FullSim	ongoing	Nov-26		Kinfit, ME, Jet Finding
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tokyo	H->tautau CP	500	FullSim	ongoing		Dec 12	Kinfit, angular reco
Davide Mellini		Marcel Vos / LAL	IFIC	ttH	600 !	?	planned			currently working on ttH at ATLAS
Emi Kou		Francois LeDiberder	LAL	HO ew corrections ttbar prod		Pheno	ongoing			Whizard / Madgraph interface…?
Felix Mueller	felix.johannes.mueller@desy.de	JL	DESY	ee-> nunu H, BRs & ZH/WW	350	FullSim	almost done	Nov-26		
Graham Wilson			Kansus U	W mass measurement	161/350/500	?				
Hale Sert	hale.sert@desy.de	JL	DESY	Light Higgsinos, dM <= 1 GeV	500	SGV & FullSim	ongoing	Oct 22		has to hand-in thesis in early 2015
Hiroaki Ono	ono@ngt.ndu.ac.jp	Akiya	NDU	Higgs BR, Z->ll,qq	250/350	FullSim	ongoing			H-->bb,cc,gg & H-->WW*, updating with mH=125GeV
Jacqueline Yan	rinrin84@gmail.com	Daniel Jenas	Tokyo	Higgs leptonic recoil	350	FullSim	ongoing		Mar 13	comparison with 250 GeV, next focus on mass
Junping Tian	tianjp@post.kek.jp	Keisuke/Claude/Jenny	KEK	ee->vvHH, 2x H-->bb	1000	Full Sim	almost	Feb-18	Feb-20	need be updated to mH=125GeV, being considered as one early publication
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	vvH with H-->bb, WW*, ZZ*	500	Full Sim	almost			For total width study, only full hadronic decay of ZZ* remains to be done
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	H->invis Z-> leptonic	500	Full Sim	done			For total width study, only full hadronic decay of ZZ* remains to be done
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK	ZZ-fusion production eeH	500	Full Sim	ongoing			H-->bb done, going to explore anomalous HZZ coupling, particularly CP violation effect
Koya Tsuchimoto	tsuchimoto@azusa.shinshu-u.ac.jp	Katsushige	Shinshu	single W process, W mass and TGC	250/500	Full Sim	ongoing	Jan-21	Feb-27	motivated by impact of ScECAL on JER, going to be a master project
Madalina Chera	madalina.chera@desy.de	JL	DES							Comparison LoI, DBD, SGV
Marça Boronat		Marcel Vos / LAL	IFIC							new method, ~ 6 months
Marcel Vos			IFIC							Jet finding
Mark Thomson	thomson@hep.phy.cam.ac.uk		Car							
Mark Thomson	thomson@hep.phy.cam.ac.uk		Car							publication in prep
Martin Perelló		Marcel Vos / LAL	IFIC							take over from Nacho
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp		Tok							PID, jet pairing, kin fit!
Mikael Berggren	mikael.berggren@desy.de		DES							incl. selectrons from S.Caiazza
Moritz Habermehl	moritz.habermehl@desy.de	JL	DES							Taking over from A.Chaus, focus on systematics
Nacho Garcia		Marcel Vos / LAL	IFIC							arXiv
PhD MPI			MPI							
Postdoc MPI			MPI							
Rashid Mehdiyev	Rashid.Mehdiyev@carleton.ca	Alain Bellerive	Car							
Shin-ichi Kawada	s-kawada@huhep.org	Taikan / Tomohiko	Hiro							updating with mH=125 GeV
Shun Watanuki	watanuki@epx.phys.tohoku.ac.jp	Jan	Toh							Fitting techniques, systematic error of mass, CP
Shun Watanuki	watanuki@epx.phys.tohoku.ac.jp	Jan	Toh							Fitting techniques, systematic error of mass, CP
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL							title of thesis: "Top quark production at the ILC and optimisation of Particle Flow Algorithm
Takuaki Mori	takuaki@icepp.s.u-tokyo.ac.jp	Tomohiko	Tok							input for gaugino mass unification plot
Tatsuhiko Tomita	tomita@epp.phys.kyushu-u.ac.jp	Taikan	Kyu							ISR tagging, cut opt for model independency / LEAVING?
Tino Calancha	calancha@post.kek.jp	Akiya	KEK							now mainly on H-->gam gam at 250 GeV, and H-->mumu at 250 and 500 GeV
Tomohiko Tanabe	tomohiko@icepp.s.u-tokyo.ac.jp		Tok							need scan points
Tomohisa Ogawa	ogawat@post.kek.jp	Junping / Keisuke	KEK							PhD project
Tomohisa Ogawa	ogawat@post.kek.jp	Junping / Keisuke	KEK							PhD project
Yorgos Voutsinas	georgios.voutsinas@desy.de	JL/FG	DES							Taking over from Hale, focussing on VXD requirements
Yuji Sudo	sudo@phys.kyushu-u.ac.jp	Taikan	Kyu							looking at systematics, cut opt / MVA
Yuko Shinzaki	shinzaki@epx.phys.tohoku.ac.jp	Jan / Akimasa	Toh							e+e- ? WH ? W(WZ) / GONE TO INDUSTRY
Trong Hieu	trong.hieu.tran@llr.in2p3.fr	Vincent Boudry	LLR							
Imad Laktineh	imad.baptiste.laktineh@cern.ch		Lyo							SDHCal
Imad Laktineh	imad.baptiste.laktineh@cern.ch		Lyo							SDHCal
Detector Optimisation										
Benjamin Boitrelle	benjamin.boitrelle@desy.de	IM Gregor	DES							Physics benchmark: H->ccbar
Dan Yu	dan.yu@llr.in2p3.fr	Vincent Boudry	LLR							
Hiroki Sumida		Taikan	Kyu							
Mikael Berggren	mikael.berggren@desy.de	JL	DES							
Sergei Schuwalow			DES							
Steven Green		Mark Thomson	Car							
Tino Calancha	calancha@post.kek.jp	Akiya	KEK							Physics benchmark: H->gammagamma, H-->mumu
Tomohisa Ogawa	ogawat@post.kek.jp	Junping / Keisuke	KEK							Physics benchmark: H->invisible, leptonic recoil with various TPC radius (SGV); continue
Yorgos Voutsinas	georgios.voutsinas@desy.de	JL/FG	DES							Physics benchmark: light Higgsinos
Reconstruction & Analysis Tools										
Bo Li		Keisuke	Tsin							inhomogeneous B-Field
Brian van Doren		Graham	Kan							application: eg Higgs mass reco
		Frank Gaede	DES							
Dan Yu	dan.yu@llr.in2p3.fr	Vincent Boudry	LLR							
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tok							
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tok							
Daniel Jeans	jeans@icepp.s.u-tokyo.ac.jp		Tok							
Eldwan Brianne	eldwan.brianne@desy.de	MB	DES							paused due to Calice testbeam
Frank Gaede			DES							
Hale Sert	hale.sert@desy.de	JL	DES							has to hand-in thesis in early 2015
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK							implement major LCME class in SM, support anomalous coupling, more development on
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK							for nunuHH at 1TeV
Junping Tian	tianjp@post.kek.jp	Keisuke	KEK							Mini-jet based, incorporating new Geogi Algorithm
Marcel Vos	marcel.vos@cern.ch		IFIC							
Mark Thomson		NN? Masakazu???	Car							
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp		Tok							physics benchmark:ZHH
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp	Tomohiko/ Taikan / Jan	Tok							
Masakazu Kurata	kurata@icepp.s.u-tokyo.ac.jp		Tok							physics benchmark:ZHH, tt
Mikael Berggren	mikael.berggren@desy.de		DES							will be in next release, physics appl: ZHH ADAPT TO HIGGS SAMPLES
Mikael Berggren	mikael.berggren@desy.de		DESY	SGV Maintenance		SGV	stable			several improvements in pipeline
Moritz Habermehl	moritz.habermehl@desy.de	MB	DESY	Whizard 2 comissioning			ongoing			new GuineaPig interface, physics appl: WIMPs
Nacho Garcia		Marcel Vos / LAL	IFIC	Jet reconstruction	500	FullSim	ongoing			application: top couplings
Shaojun Lu		TIno Calancha	DESY/KEK	MC Production				Feb-04		
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL	b jet charge	500	FullSIm	ongoing	Feb-11		application: top couplings
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL	Matrix element method	500	FullSIm	plan			application: top couplings
Sviatoslav Bilokin	bilokin@lal.in2p3.fr	Roman Poeschl, Dirk Zerwas	LAL	PFA development		FullSIm	plan			improving PandoraPFA
Taikan Suehara	suehara@phys.kyushu-u.ac.jp	Shin-ichi	Kyushu	tau finder	250/500	Full Sim	almost			optimization
Tino Calancha	calancha@post.kek.jp	Akiya	KEK	Covarince matrix of four momentum, event by event mass resolution		Full Sim	ongoing			done for charged track in H-->mumu, can start for H-->gam gam
Yorgos Voutsinas	georgios.voutsinas@desy.de	FG	DESY	mini-vector tracking in VDX/SIT		FullSim	nearly done			
Yorgos Voutsinas	georgios.voutsinas@desy.de	FG	DESY	ILD Performance		FullSim	ongoing	Feb-18		
	PFA -> write email to Mark									

47 physics analyses

+

9 det. opt. analyses

+

29 analyses on tools

this talk is trying to review some of the status, highlight the main news and give thoughts for next step

all analyses are motivated to answer some of the questions

physics case

1. ultimate precision reach in Higgs and top couplings? (deviation -> new physics + scale; pattern -> BSM fingerprint)
2. can we discover new particles and its nature? (extra Higgs, SUSY, composite, dark matter, Z')
3. can we precisely know the radiative correction? (mH, mt, mw, αs)

detector optimisation

4. impact of detector size, granularity, B-field, etc.? (impact on physics performance)
5. can we justify our sub-detector technologies from physics point of view? (e.g. TPC)
6. can we control systematics? (calibration of ecm, p, JES, flavour tagging eff.)

accelerator properties

7. impact of centre-of-mass energies? (optimal running)
8. impact of beam polarisations?
9. impact of beam induced backgrounds?

general status of the analyses

physics case

- the focus in the past;
- quite a lot have been done;
- already in a very good shape;
- strengthen physics case always appreciated

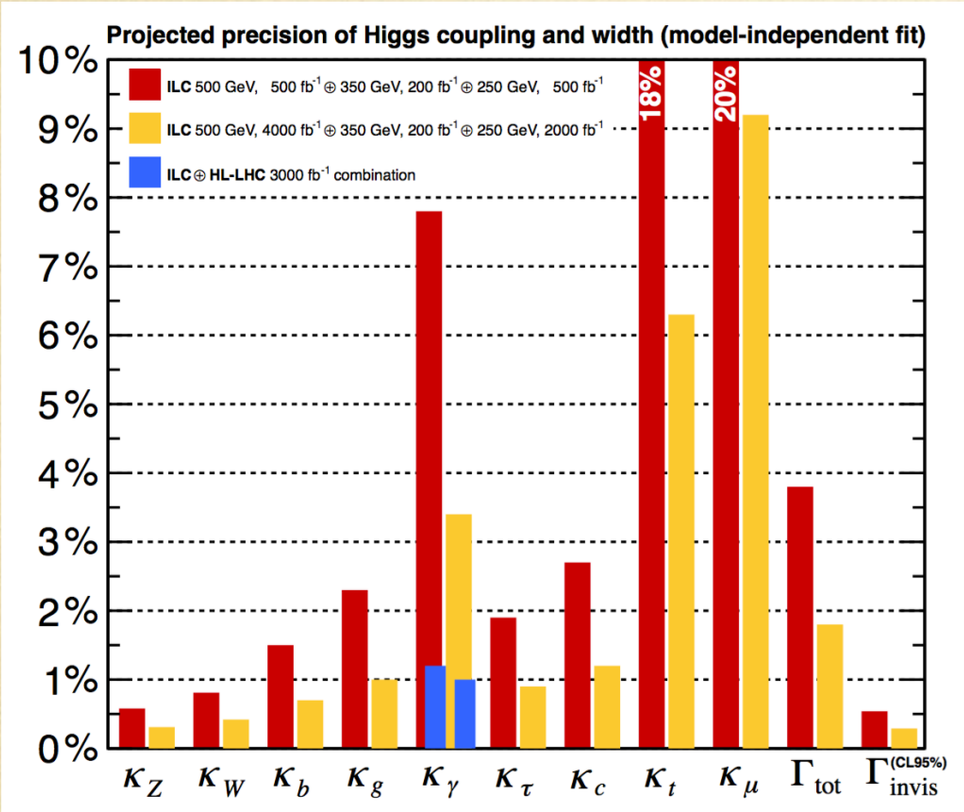
detector optimisation

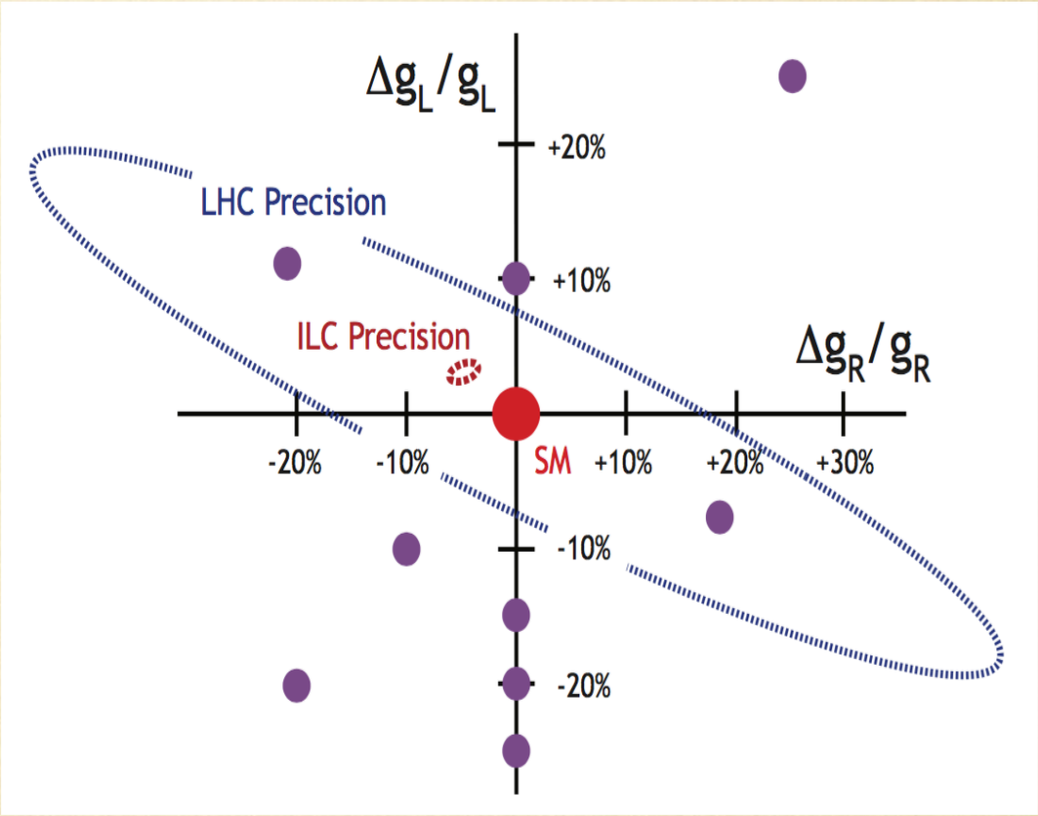
- focus was mainly on sub-detector performance;
- impact on physics performance just started;
- benchmark processes defined;
- developing proper tools to evaluate performance

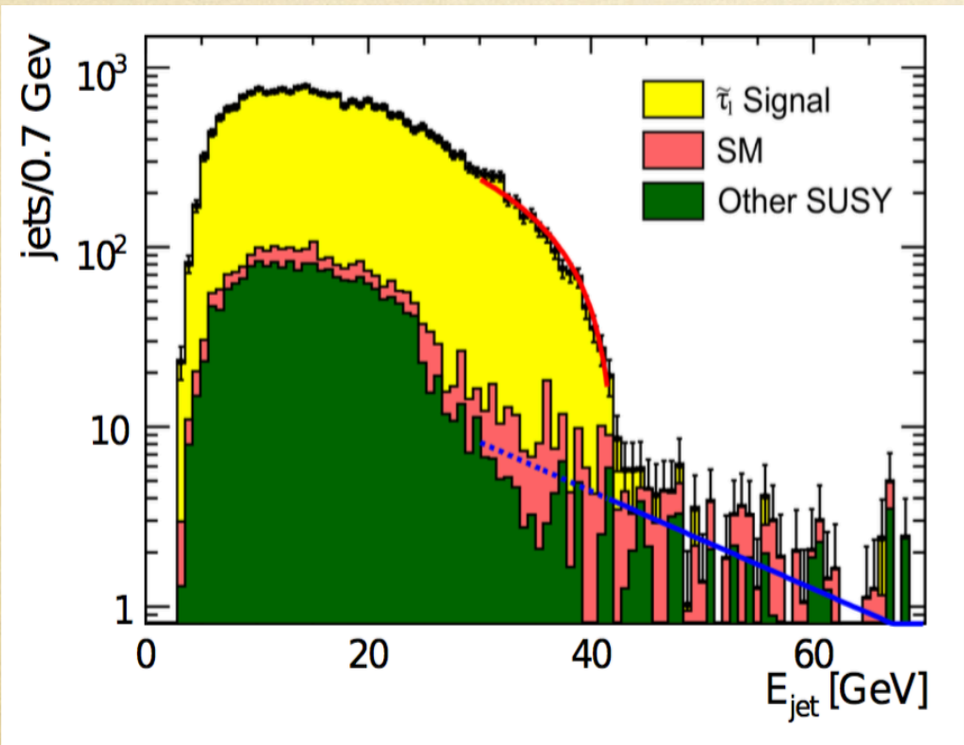
accelerator properties

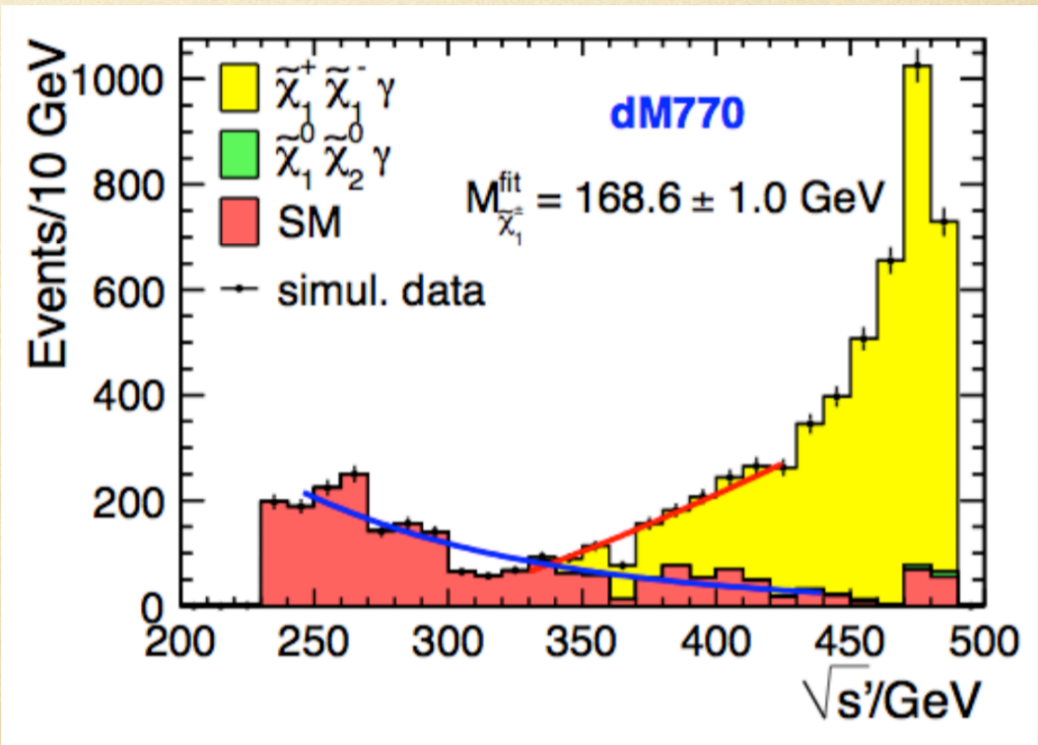
- Ecm, polarisations well investigated in analyses for physics case;
- next on beam spectrum, beam background

(A) what's been achieved: analyses for the ILC physics case (selected)



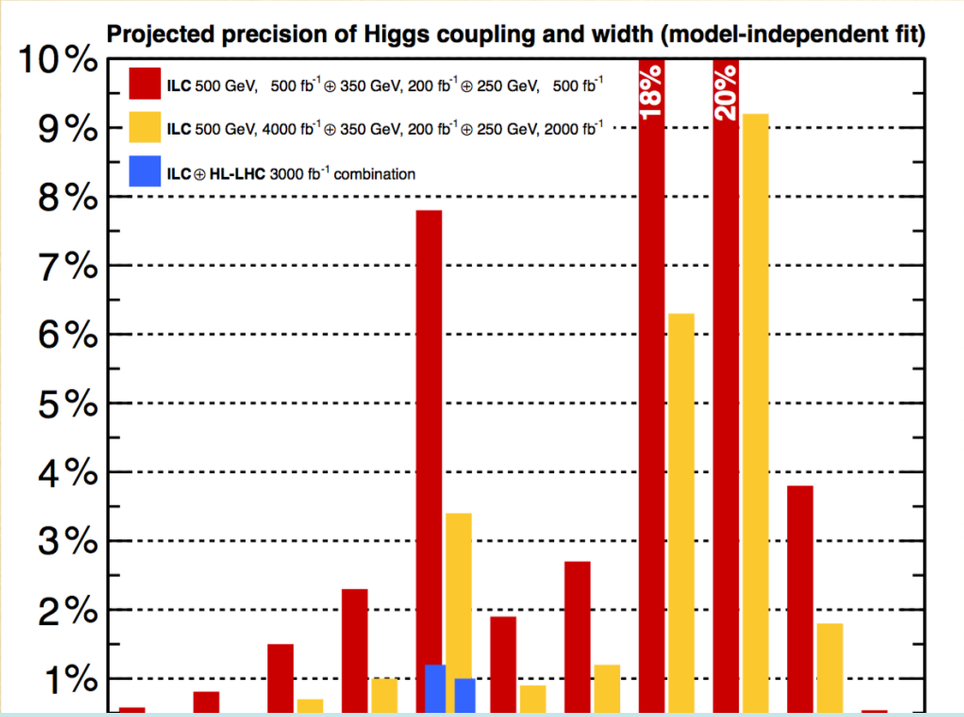


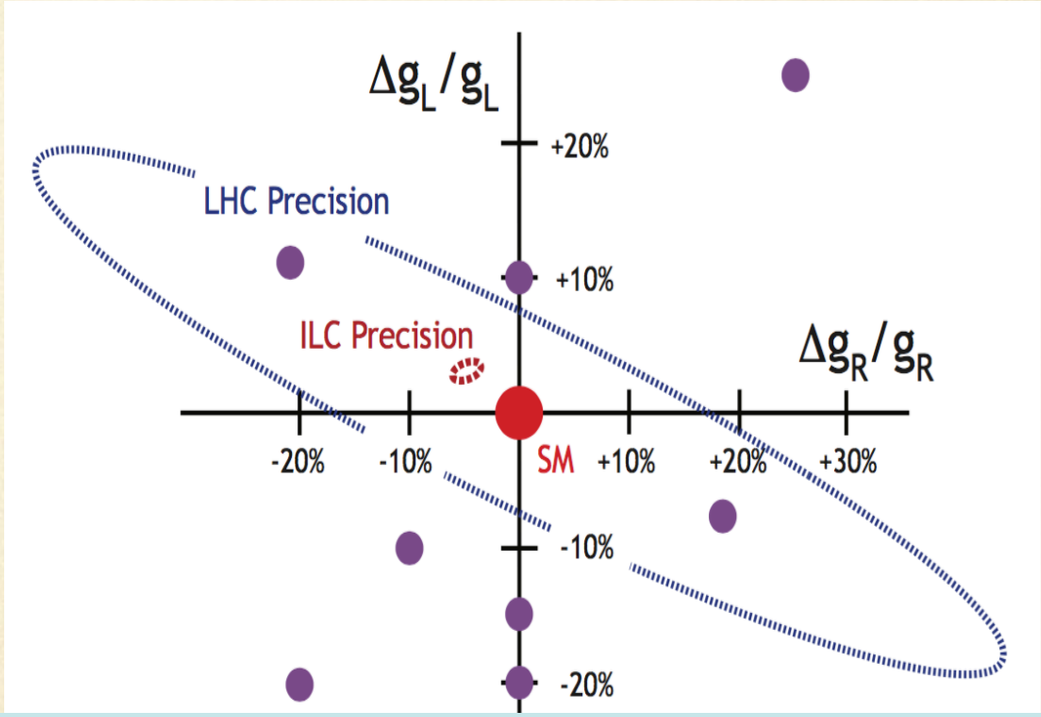




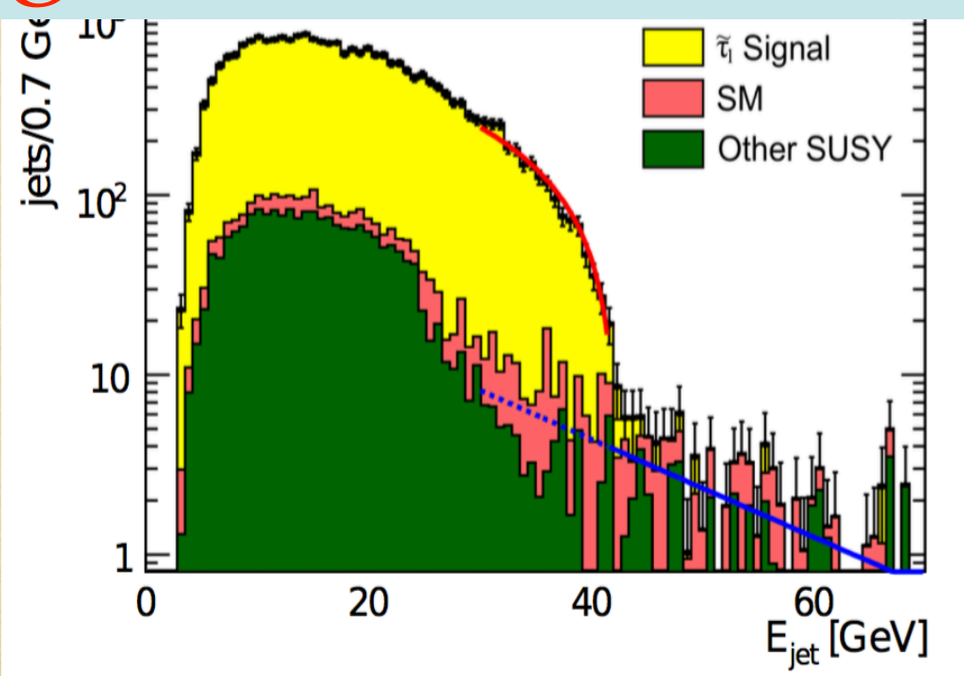
arXiv: 1506.05992

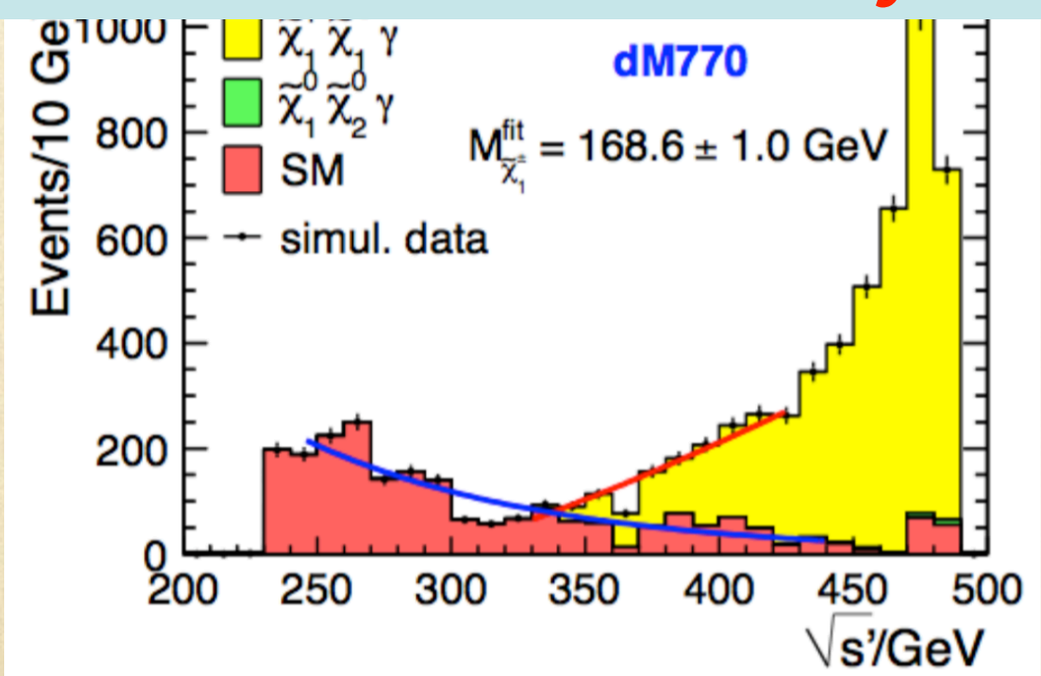
(A) what's been achieved: analyses for the ILC physics case (selected)





significant contribution from ILD analyses





arXiv: 1506.05992

(A: physics case) status of selected ongoing analyses

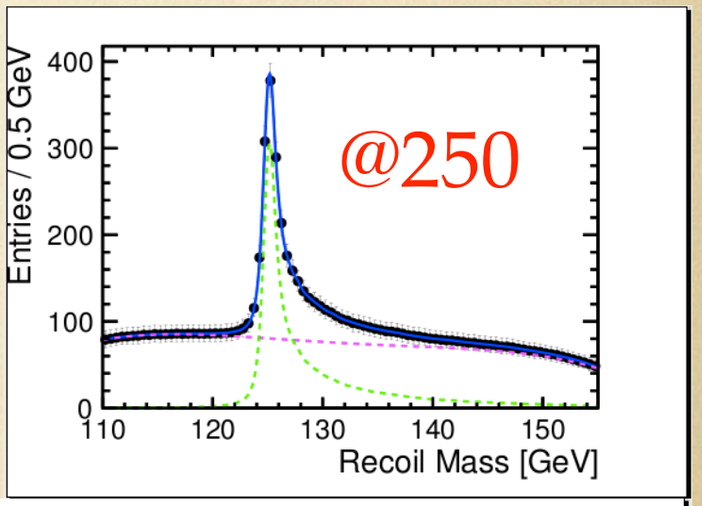
- Higgs mass
- Higgs CP admixture
- model independent meas. of σ_{ZH}
- Higgs self-coupling
- $\nu\nu H$, H—>bb/cc/gg
- gaugino mass measurement

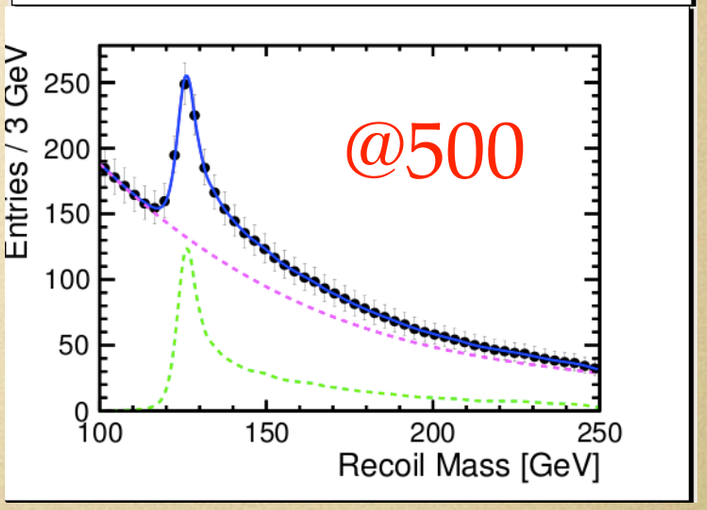
sorry for incomplete list due to time limit; e.g. see talk on ttH by Y.Sudo, WIMP search by T.Tanabe, H—>$\mu\mu$ by M.Faucci, Stau co-annihilation by M.Berggren, W mass by G.Wilson; top related analyses see overview talk by R. Poeschl

ΔM_H

- eventually one source of parametric error: for $\Delta M_H \sim 50$ MeV —> $\Delta\Gamma_{H\text{->}WW^*} \sim 0.5\%$
- news: (talk by J.Yan) now we have a full picture of ΔM_H at all $\sqrt{s}$
- currently rely on recoil mass measurement: dominated by mea. at 250 GeV, ~12 MeV in H20; one of main factors we need more data at 250 GeV
- however, would we be satisfied by ΔM_H~500 MeV after the first 4 years of running?
- news: (talk by A.Ebrahimi) direct mass reconstruction using H—>bb or H—>gg or H—>WW* becomes very interesting; analysis just started; focus shall be on systematic errors from JES, hadronization models, jet clustering, overlay

250GeV		mass[MeV]
	left	36
	right	40
350GeV		
	left	96
	right	110
500GeV		
	left	492
	right	566





Higgs CP properties

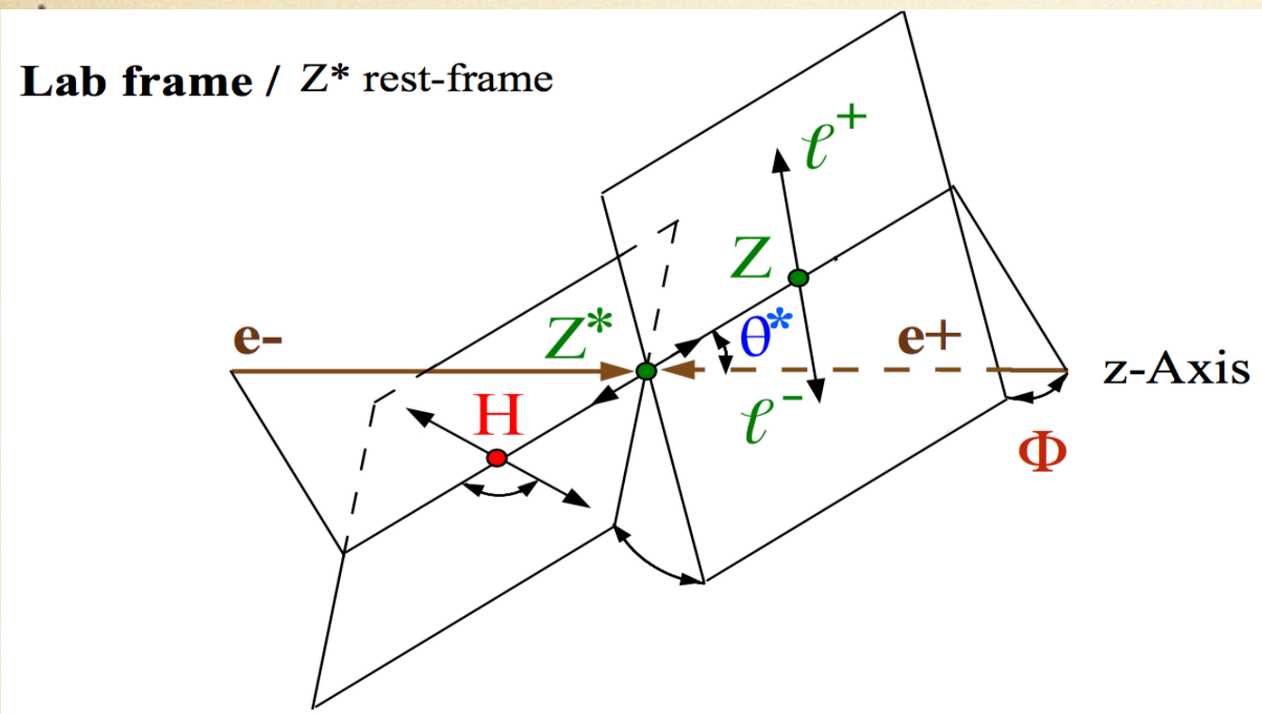
$$L_{HVV} = 2M_V^2(\frac{1}{v} + \frac{a}{\Lambda})HV_\mu V^\mu + \frac{b}{\Lambda}HV_{\mu\nu}V^{\mu\nu} + \frac{\tilde{b}}{\Lambda}HV_{\mu\nu}\tilde{V}^{\mu\nu}$$

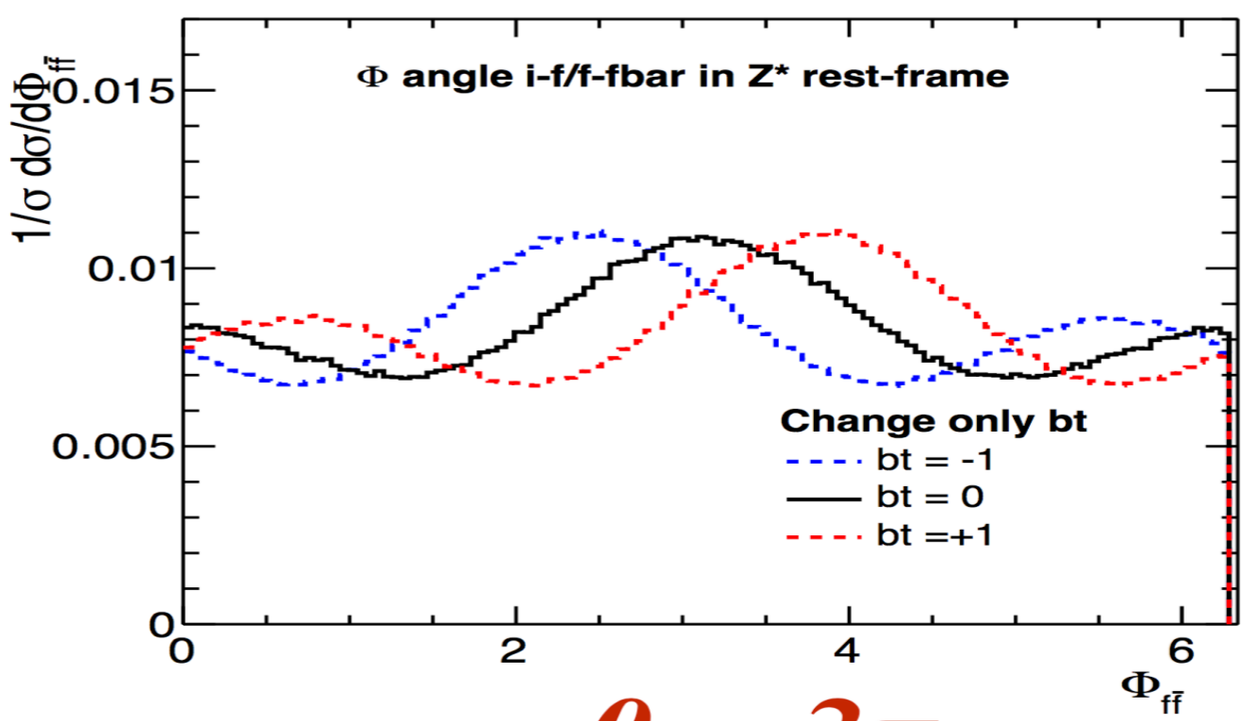
$$L_{Hff} = -\frac{m_f}{v}H\bar{f}(\cos\alpha + i\gamma^5\sin\alpha)f$$

- one basic property of Higgs; admixture imply CP violation in Higgs sector —> connect to electroweak baryongenesis.
- two complementary measurements: anomalous HVV coupling —> general Lorentz structure, CP odd contributes via loop correct; Hff ($H\tau\tau$/Htt) coupling, tree level CP odd contribution.
- news: (talk by T.Ogawa) full analysis of anomalous HZZ using all relevant channels, O(0.01) constraints on b and b-tilde (much better sensitivity than Snowmass studies)
- news: (talk by D.Jeans, arxiv: 1507.01700) a new novel τ reconstruction using impact parameter; next apply to Higgs CP analysis

Higgs CP properties

$$L_{HVV} = 2M_V^2(\frac{1}{v} + \frac{a}{\Lambda})HV_\mu V^\mu + \frac{b}{\Lambda}HV_{\mu\nu}V^{\mu\nu} + \frac{\tilde{b}}{\Lambda}HV_{\mu\nu}\tilde{V}^{\mu\nu}$$





$0 \sim 2\pi$

ture imply CP violation in Higgs
aryongenesis.

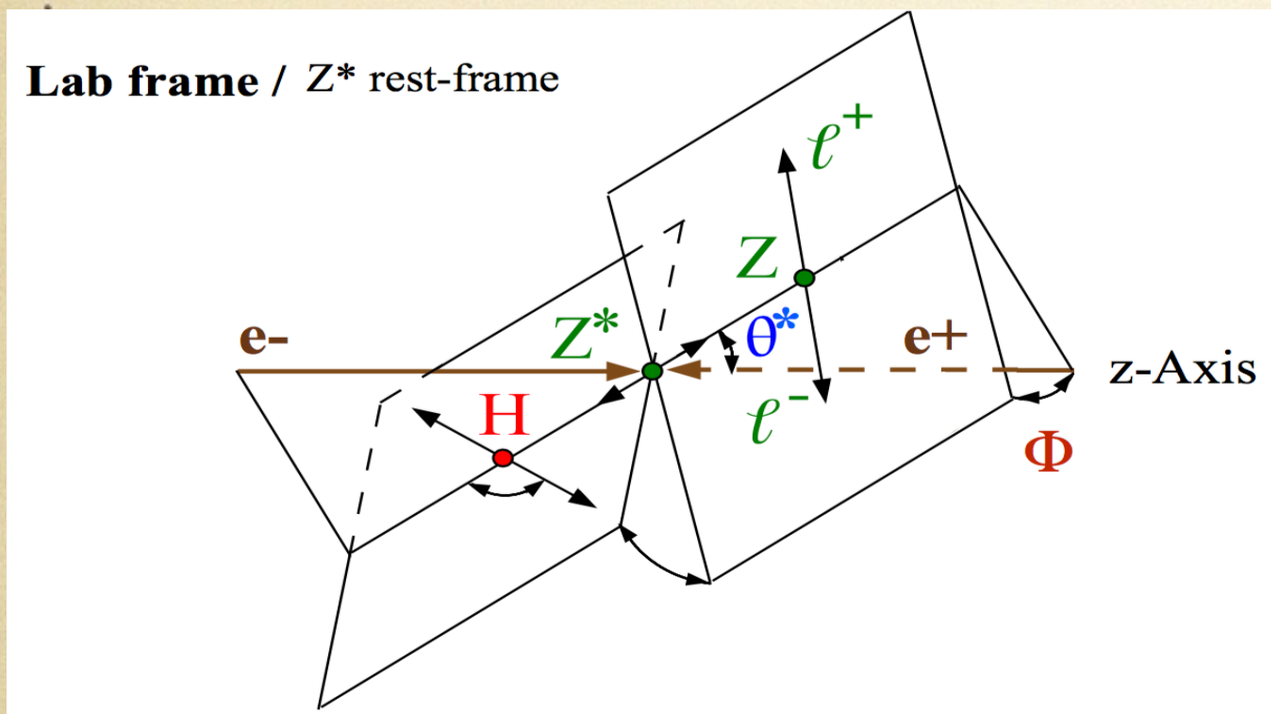
: anomalous HVV coupling —>
ontributes via loop correct; Hff
dd contribution.

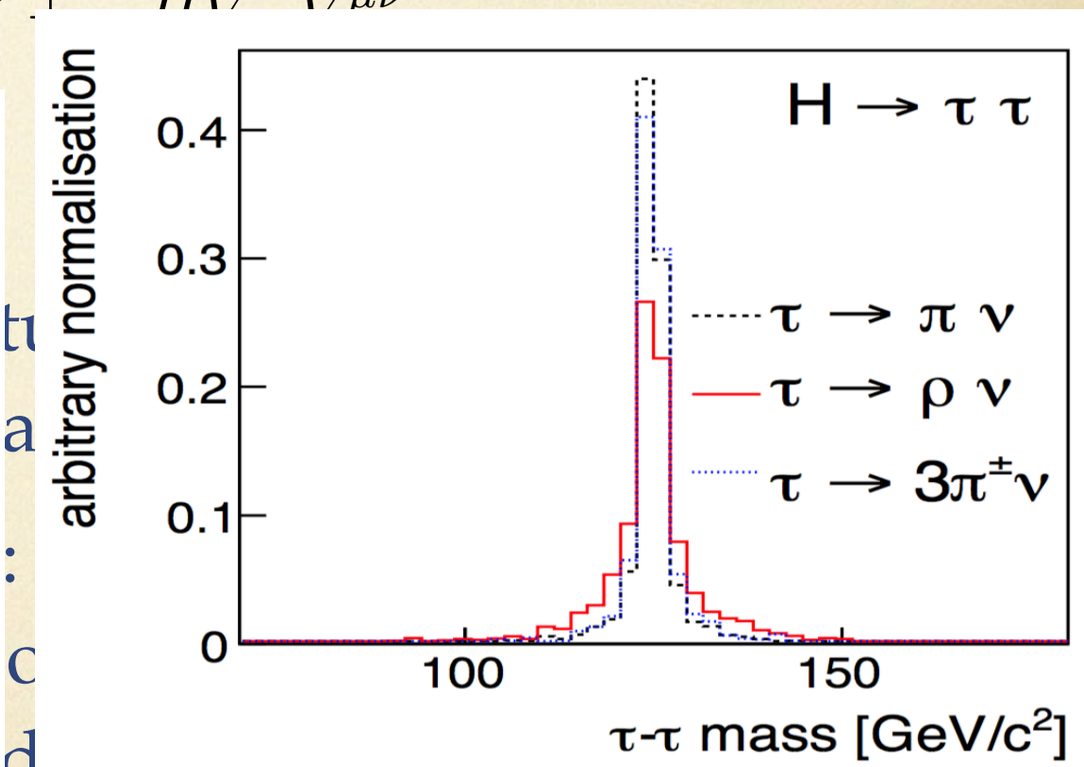
is of anomalous HZZ using all
ts on b and b-tilde (much better

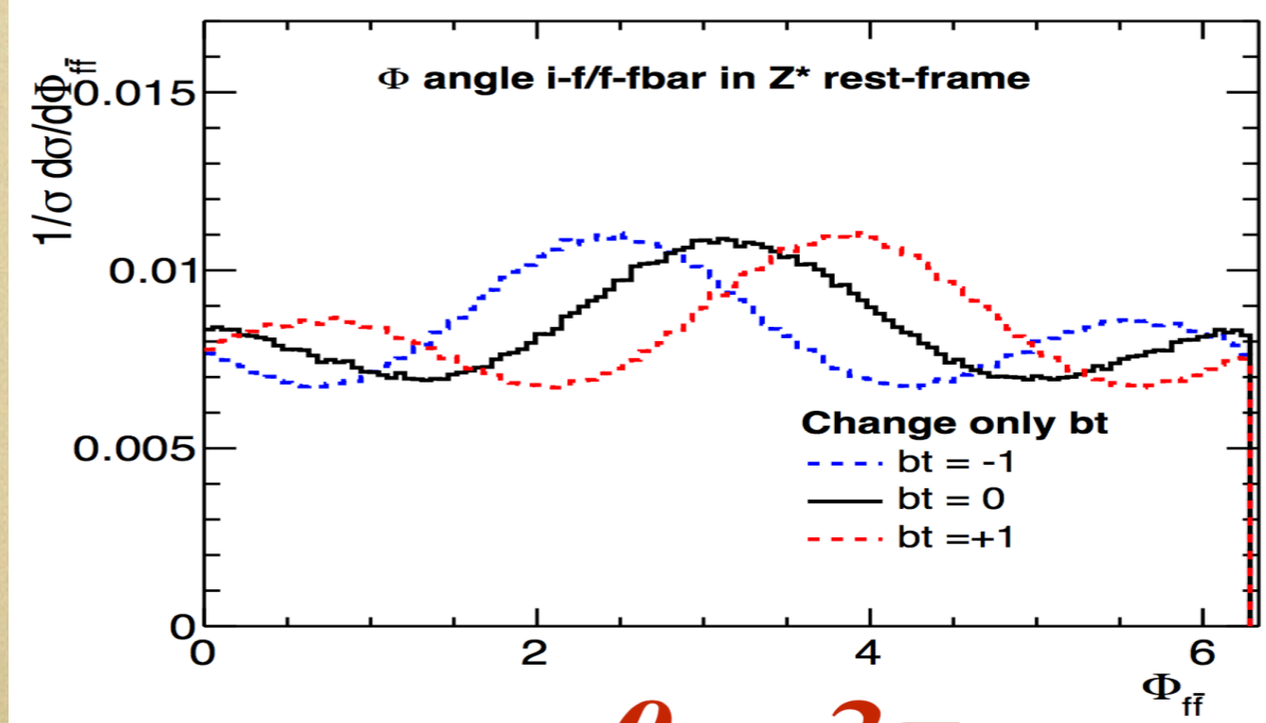
01700) a new novel τ reconstruction
to Higgs CP analysis

Higgs CP properties

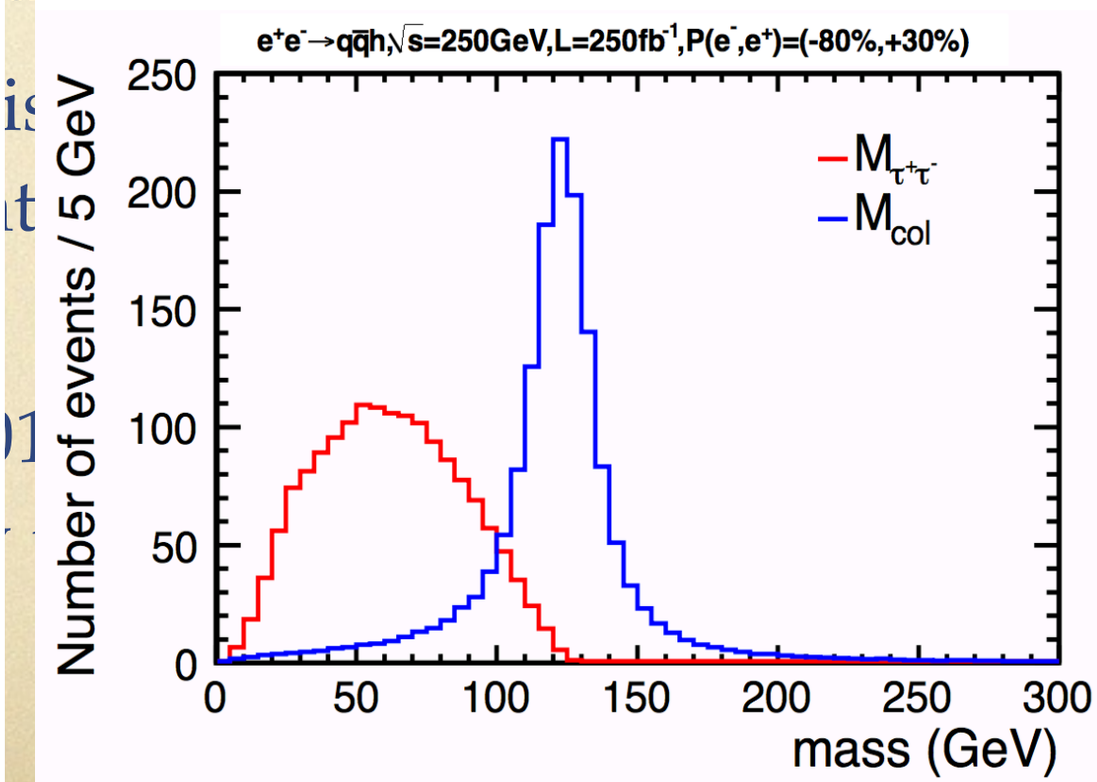
$$L_{HVV} = 2M_V^2(\frac{1}{v} + \frac{a}{\Lambda})HV_\mu V^\mu + \frac{b}{\Lambda}HV_{\mu\nu}V^{\mu\nu} + \frac{\tilde{b}}{\Lambda}HV_{\mu\nu}\tilde{V}^{\mu\nu}$$







$0 \sim 2\pi$



model (in-)dependence of σ_{ZH}

- flagship measurement at LC, key to get all couplings model independently
- news: (talk by J.Yan) leptonic recoil analysis is proofed to be model independent; efficiencies of various Higgs decay modes ~1%; with very large fluctuation of each BR (15~20%), bias ~0.1% for μμX, ~0.3% for eeX, at 250, 350 and 500 GeV
- news: (M.Thomson, arxiv:1509.02853) hadronic recoil analysis also shows very promising model independence; Δeff ~15%; for ΔBR of 5%, bias ~1%, at 350 GeV
- for H20, $\Delta\sigma_{ZH}$ ~0.6% (leptonic and hadronic combined)
- is the bias already sufficiently small? (depends on the knowledge of exotic modes)

model (in-)dependence of σ_{ZH}

$H \to XX$	bb	cc	gg	$\tau\tau$	WW^*	ZZ^*	$\gamma\gamma$
Lepton Finder	93.70%	93.69%	93.4%	93.99%	94.01%	93.74%	93.74%
Lepton ID+PreCuts	92.16%	92.11%	91.8%	92.36%	92.33%	92.21%	92.01%
$M_{inv} \in [73, 120]$ GeV	90.14%	90.27%	89.89%	90.38%	90.27%	90.38%	90.16%
$P_{t,dl} \in [10, 70]$ GeV	89.94%	90.08%	89.68%	90.18%	90.04%	90.16%	89.99%
$P_{t,sum} < 6$ GeV	89.92%	90.06%	89.67%	90.03%	90.01%	90.13%	89.34%
$\lvert\cos\theta_{miss}\rvert < 0.98$	89.92%	90.06%	89.67%	90.02%	90.01%	90.12%	89.32%
$\lvert\cos\theta_{dl}\rvert < 0.90$	83.24%	83.12%	82.89%	83.29%	83.35%	83.53%	82.76%
TMVA	79.48%	79.20%	78.93%	79.36%	79.36%	79.49%	78.87%
$M_{rec} \in [110, 155]$ GeV	78.94%	78.67%	78.40%	78.82%	78.84%	79.02%	78.30%

shows ve … for ΔBR of 5%, bias …

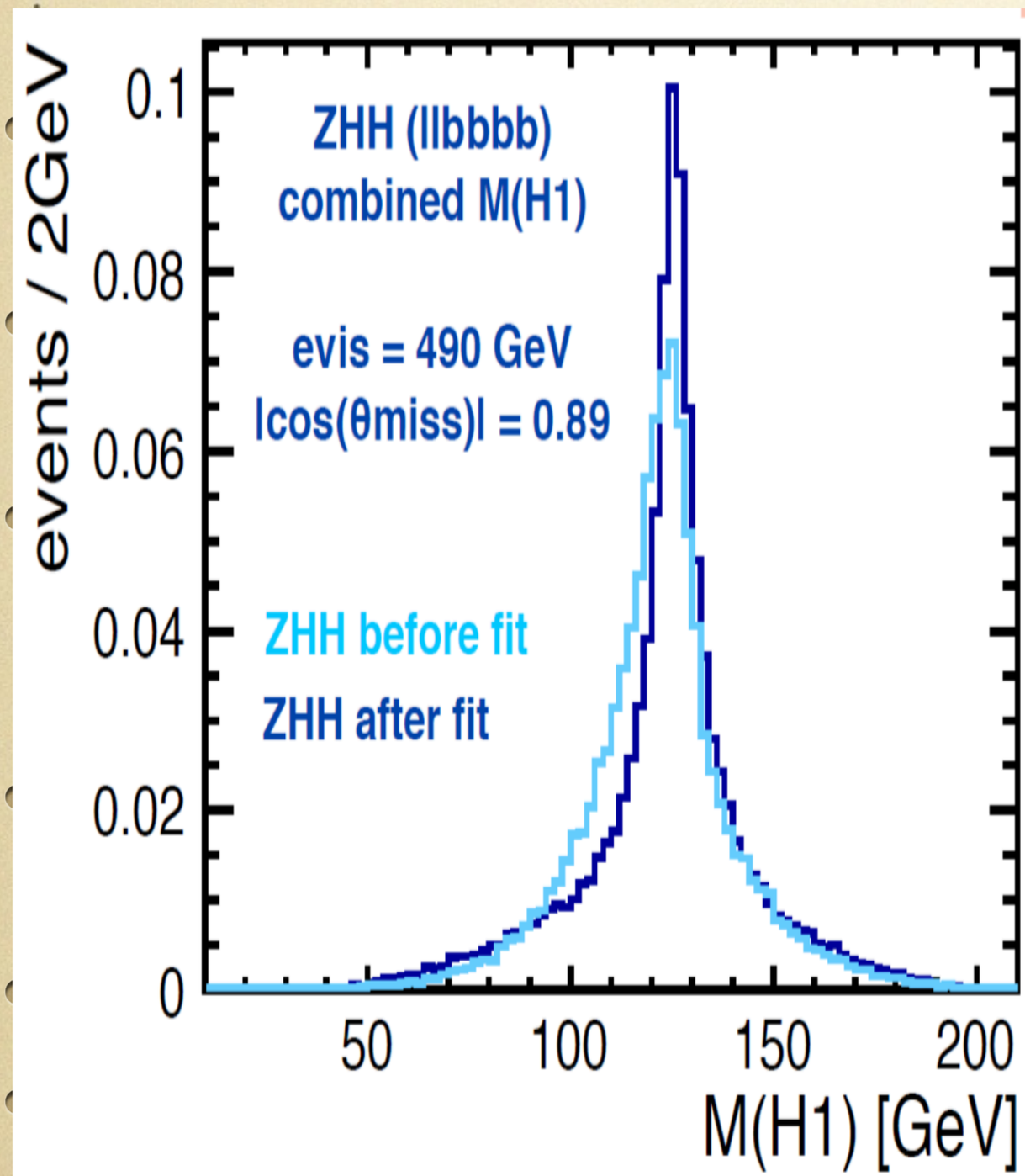
- for H20, …
- is the bia … owledge of exotic mo …

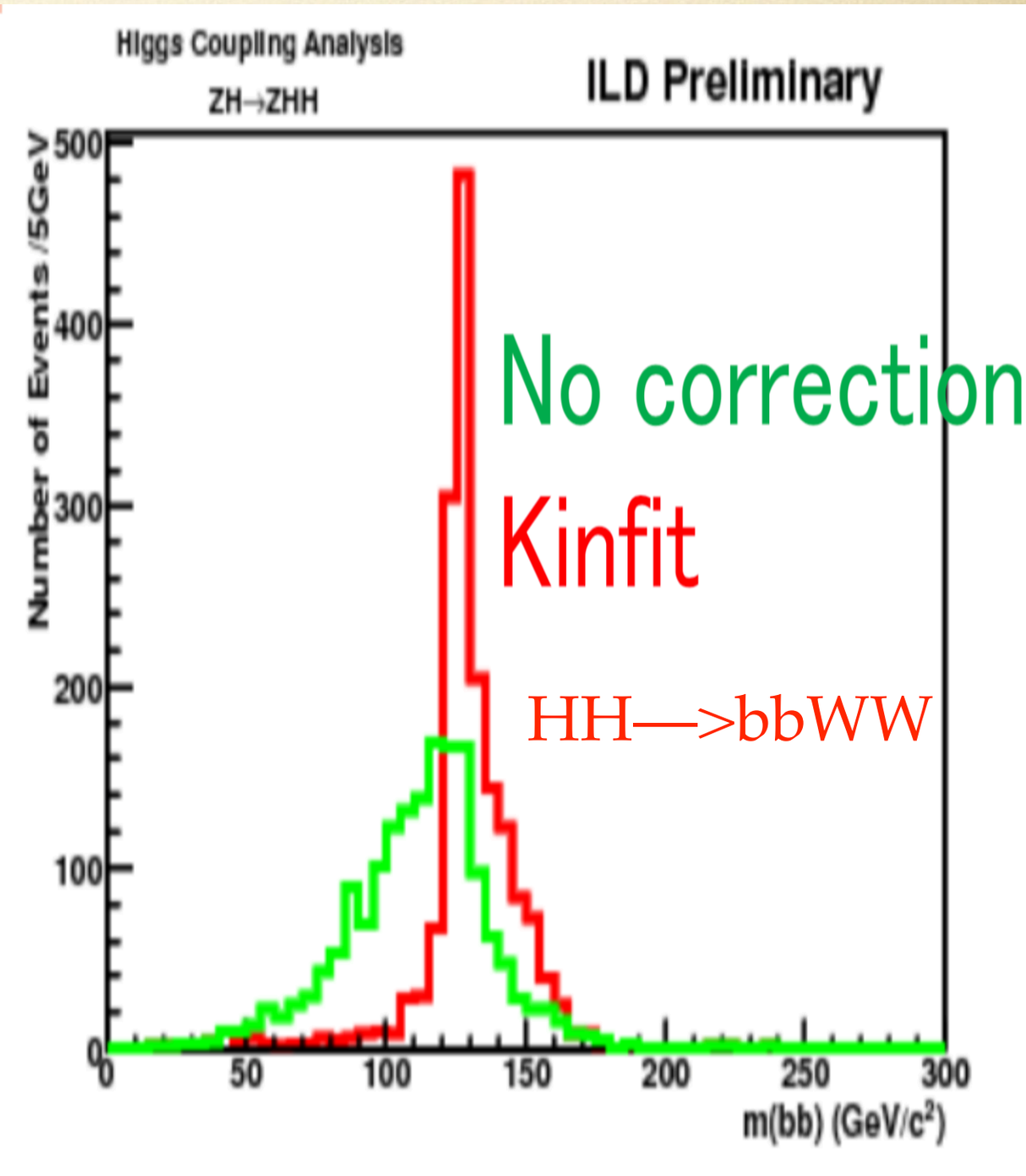
Decay mode	$\varepsilon^{vis.}_{\mathscr{L}>0.65}$	$\varepsilon^{invis.}_{\mathscr{L}>0.60}$	$\varepsilon^{vis.} + \varepsilon^{invis.}$
$H \to$ invis.	<0.1 %	23.5 %	23.5 %
$H \to q\bar{q}/gg$	22.6 %	<0.1 %	22.6 %
$H \to WW^*$	22.1 %	0.1 %	22.2 %
$H \to ZZ^*$	20.6 %	1.1 %	21.7 %
$H \to \tau^+\tau^-$	25.3 %	0.2 %	25.5 %
$H \to \gamma\gamma$	25.7 %	<0.1 %	25.7 %
$H \to Z\gamma$	18.6 %	0.3 %	18.9 %
$H \to WW^* \to q\bar{q}q\bar{q}$	20.8 %	<0.1 %	20.8 %
$H \to WW^* \to q\bar{q}\ell\nu$	23.3 %	<0.1 %	23.3 %
$H \to WW^* \to q\bar{q}\tau\nu$	23.1 %	<0.1 %	23.1 %
$H \to WW^* \to \ell\nu\ell\nu$	26.5 %	0.1 %	26.5 %
$H \to WW^* \to \ell\nu\tau\nu$	21.1 %	0.5 %	21.6 %
$H \to WW^* \to \tau\nu\tau\nu$	16.3 %	2.3 %	18.7 %

Higgs self-coupling

- direct probe of the Higgs potential, one of the most crucial measurements for ILC physics case
- news: (combined talk by M.Kurata and C.Duerig) significant progress on applying kinematic fitting
- HH—>bbbb: kinematic fitting with ISR treatment, and recovery of missing neutrinos in b-jets; 20% improved already seen in llHH ($\chi 2$ from ZHH and ZZH fitting); ννHH and qqHH modes ongoing
- HH—>bbWW*: asymmetric parameterisation for JER of b-jet; 6-15% improvement seen in several categories
- look forward to full update by kinematic fitting
- for H20, $\delta\lambda/\lambda$~27%, how much further can we go? (challenge jet clustering, MEM? see talk by J.Tian)

Higgs self-coupling





clustering, MEM? see talk by J. Han)

ννH, H—>bb/cc/gg

- ννH (WW-fusion) is crucial to get HWW coupling and Γ_H
- separation of H—>bb/cc/gg is another tag of LC
- separation of ZH and WW-fusion is essential in ννH
- news: (studies by F.Mueller) it's demonstrated those separations can be achieved simultaneously by 3D template fitting at 350 GeV; meanwhile analysis is significantly improved with MVA, more careful template fitting
- new challenge at 250 GeV? (separation much worse, interference not negligible)

	Pol (e-;e+) = (-0.8;+0.3); L=330 fb^{-1}		Pol (e-;e+) = (+0.8;-0.3); L=330 fb^{-1}	
Error on	h→other fitted	h→other fixed	h→other fitted	h→other fixed
σ(ZH)BR(h->bb)	1.9	1.9	2.3	2.2
σ(ZH)BR(h->cc)	17.9	16.7	20.1	17.8
σ(ZH)BR(h->gg)	10.6	7.6	12.9	8.4
σ(ZH)BR(h->other)	25.7	-	24.7	-
σ(WW)BR(h->bb)	1.7	1.6	9.4	9.5
σ(WW)BR(h->cc)	18.5	16.7	117.0	116.7
σ(WW)BR(h->gg)	9.8	6.7	49.6	36.8
σ(WW)BR(h->other)	23.2	-	129.2	-

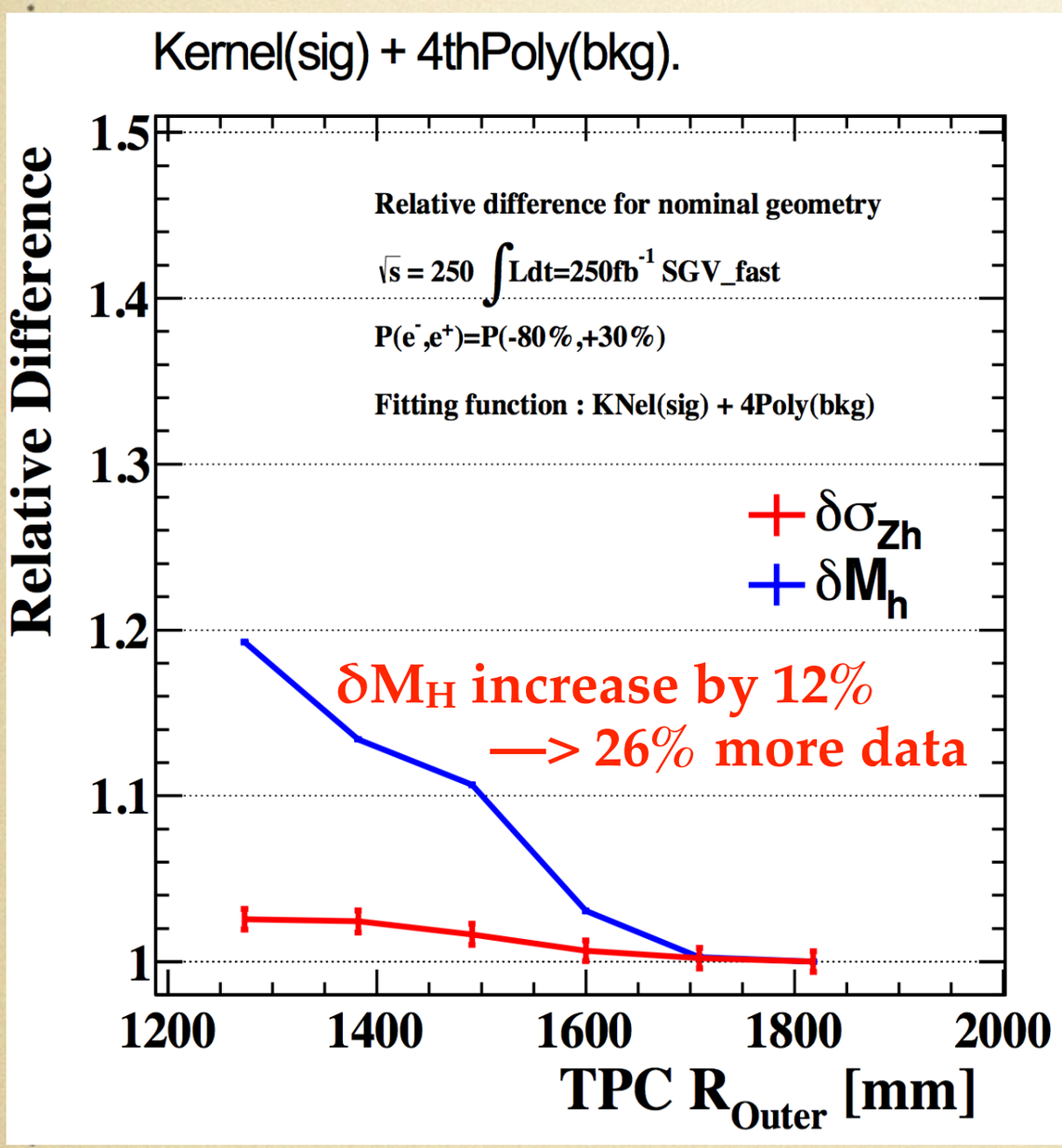
gaugino mass

- direct SUSY particles search, “Point5” benchmark
- news: (talk by M.Chera) sophisticated edge determination method and estimation of systematic error
- the edge points given by “finite impulse response” are more stable than those given by traditional fitting at LoI and DBD
- systematic error: calibrate mass at generator level (0.8-1.8%) and reconstruction level (0.2-0.9%); new method is sufficiently stable
- next: Point5 is very near current LHC exclusion limit, need updated?
- we have dM = 0.77, 1.6, >91 GeV, how about intermedia point, e.g. dM ~ 20 GeV?

	Calc.	80.17	131.53	93.24	129.06
	Sim.	Edge W_{low} [GeV]	Edge W_{high} [GeV]	Edge Z_{low} [GeV]	Edge Z_{high}[GeV]
fit	LOI	79.7±0.3	131.9±0.9	91.0±0.7	133.6±0.5
fit	DBD	79.5±0.5	130.2±1.1	91.3±0.6	146.1±4.8
filter	LOI	80.4±0.2	129.9±0.7	92.3±0.4	128.3±0.9
filter	DBD	79.6±0.2	130.1±0.8	92.1±0.3	128.9±0.8

(B) for detector optimisation: impact on physics performance

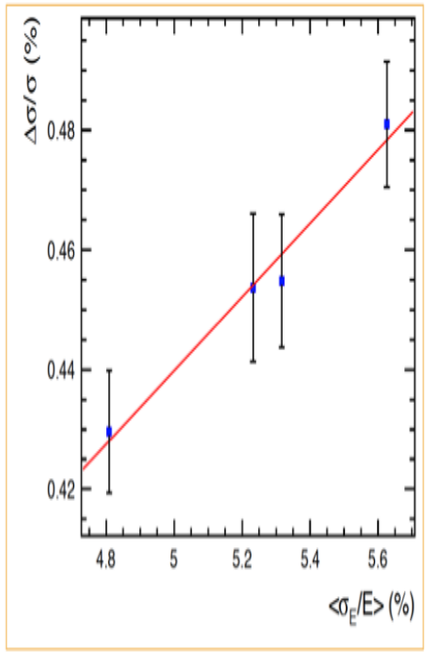
TPC radius .vs. M_H,σ_{ZH}



T. Ogawa

granularity .vs. Br(H->inv.)

Model	$\Delta\sigma_{inv} / \sigma_{SM}$	σ_m / m	$\langle \sigma_E / E \rangle$
30 layers: 5 x 5	0.43 %	4.8 %	3.4 %
30 layers: 15 x 15	0.45 %	5.3 %	3.8 %
15 layers: 5 x 5	0.45 %	5.2 %	3.7 %
15 layers: 15 x 15	0.48 %	5.6 %	4.0 %



17 % increase in jet E resolution

⇨ 12 ± 3 % decrease in sensitivity

⇨ 17 ± 4 % decrease in integrated luminosity

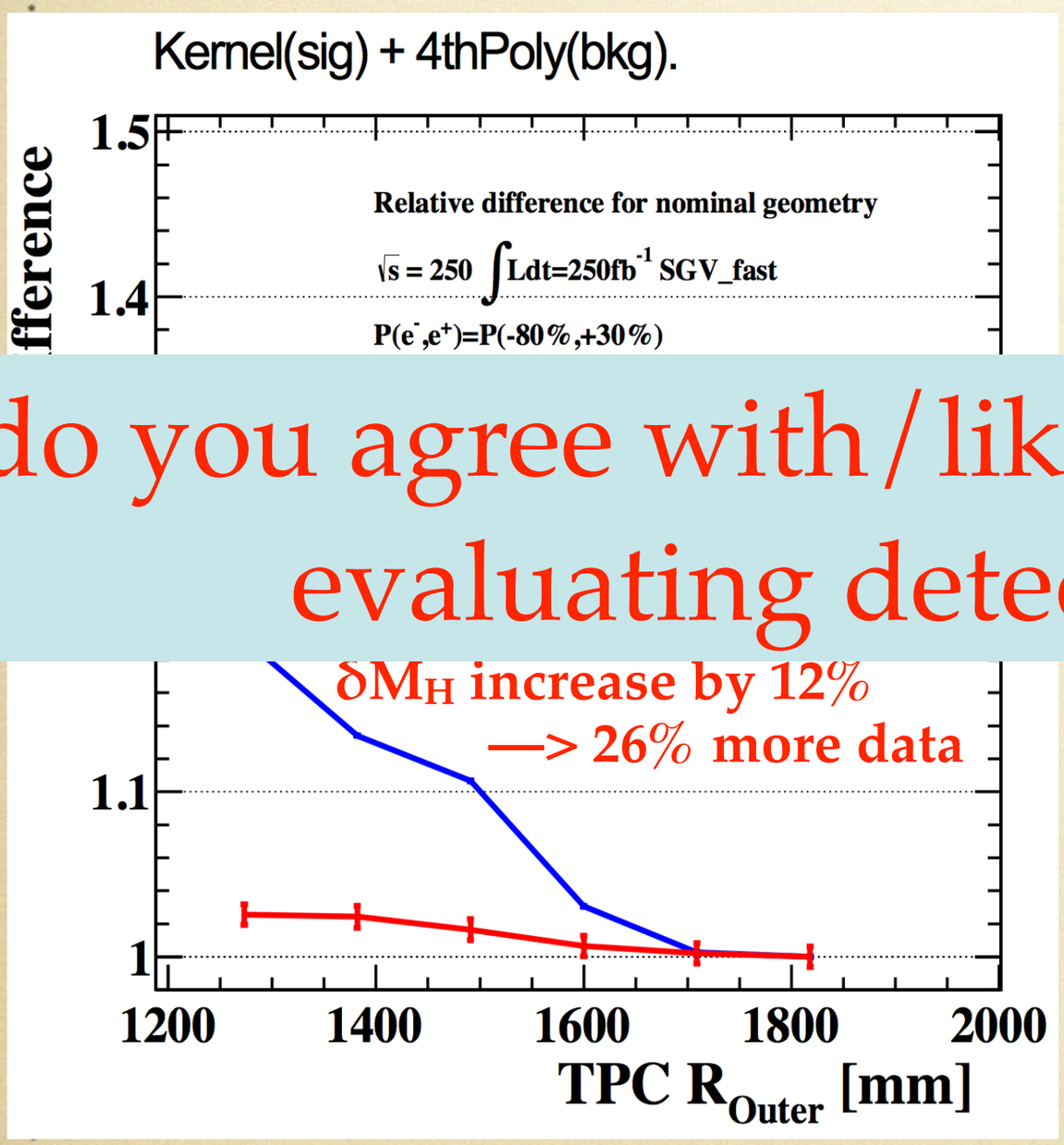
M. Tomthon @ ILD meeting 2014

K. Mei, J. Marshall

(B) for detector optimisation: impact on physics performance

TPC radius .vs. M_H,σ_{ZH}

granularity .vs. Br(H->inv.)



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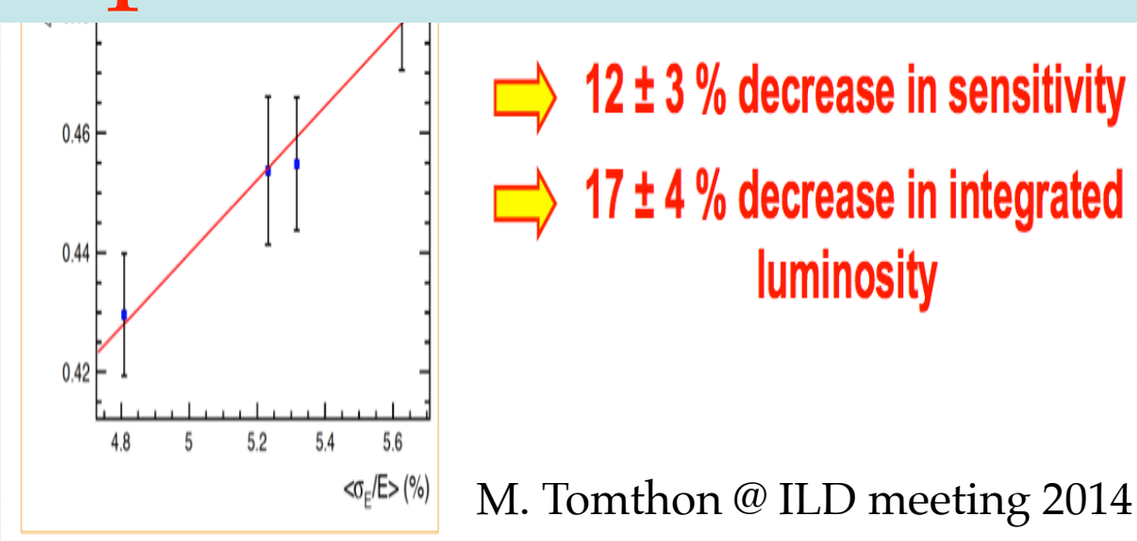
do you agree with / like / care about this way of evaluating detector performance?



M. Tomthon @ ILD meeting 2014

T. Ogawa

K. Mei, J. Marshall

benchmark processes for detector optimisation

process	physics	detector	Ecm
H—>cc	BR	c-tag JER	any
H—>μμ	BR	high P tracking	500 GeV
H—>ττ	BR, CP	τ reconstruction, PID track separation	250 GeV
H—>bb	M_H, BR	JES, JER b-tag	500 GeV
H—>invisible Z—>qq	Higgs Portal	JER	250 GeV
eνW—>eνqq	M_W, TGC	JES, JER	500 GeV
tt-bar—>6-jet	top coupling A_{FB}	b-tag, JER jet charge	500 GeV
$\chi_1^+\chi_1^-, \chi_2^0\chi_1^0$ near degenerated	natural SUSY	low P tracking PID	500 GeV
γXX	WIMPs	Photon ER & ES Hermiticity	500 GeV

in total 9 = 5 (Higgs) + 2 (EW) + 2 (BSM)

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tt-bar—>6-jet	top coupling A_{FB}	b-tag, JER jet charge	500 GeV
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γXX	WIMPs	Photon ER & ES Hermiticity	500 GeV

in total 9 = 5 (Higgs) + 2 (EW) + 2 (BSM)

give your comments / complains before not too late

(B: detector optimisation) status of tools preparation

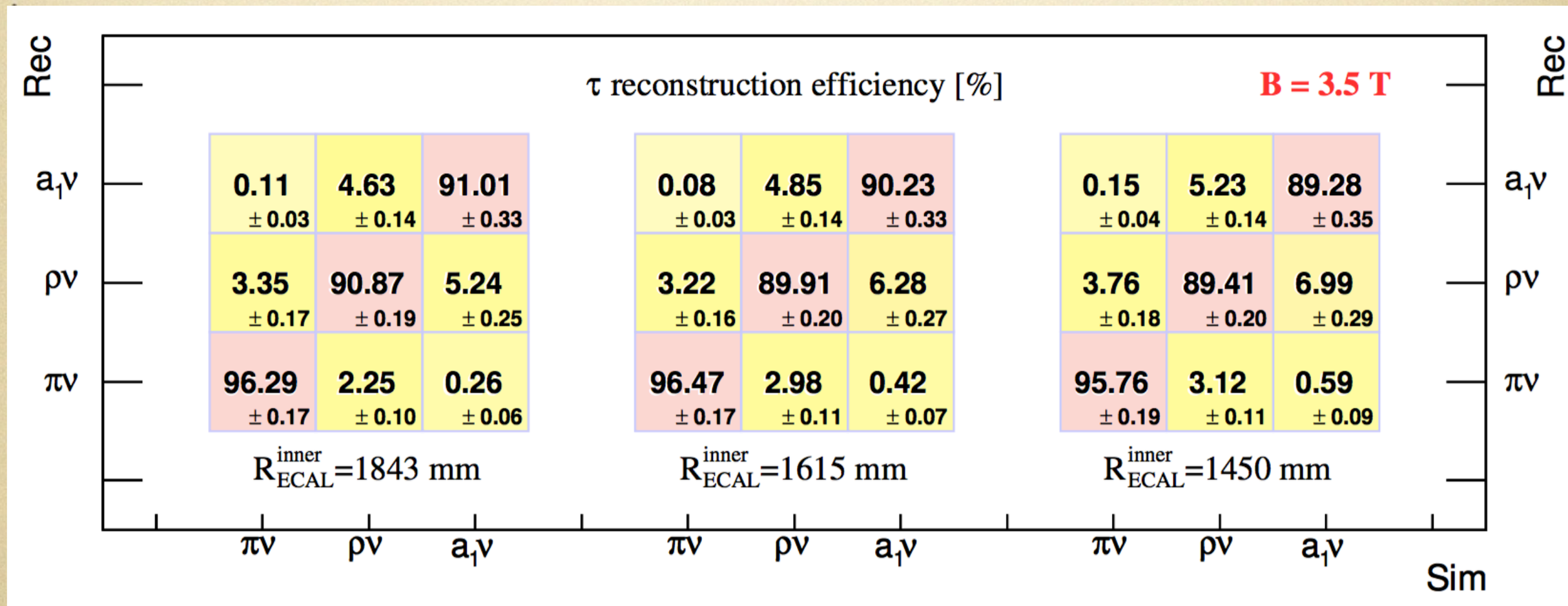
performance evaluation shouldn't be biased by improper reconstruction/analysis tools

- H—>ττ
- nearly degenerated Higgsino search
- A_{FB} in tt-bar—>hadronic
- W mass in eνW—>eνqq

again sorry for incomplete list; e.g. see talk on flavour tag by M.Kurata, PFA and its impact on ILD opt. by L.T.Huong, tracking by Frank; see more details in talks at High Level Reconstruction Workshop

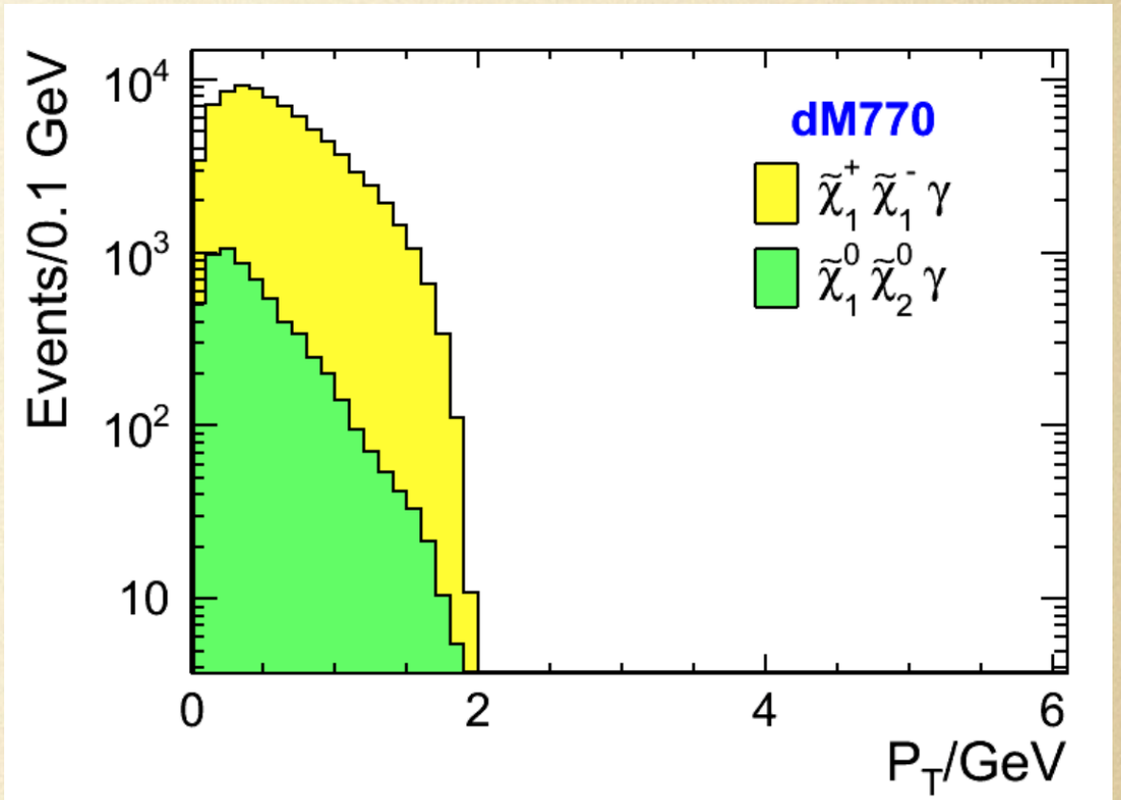
τ reconstruction efficiency

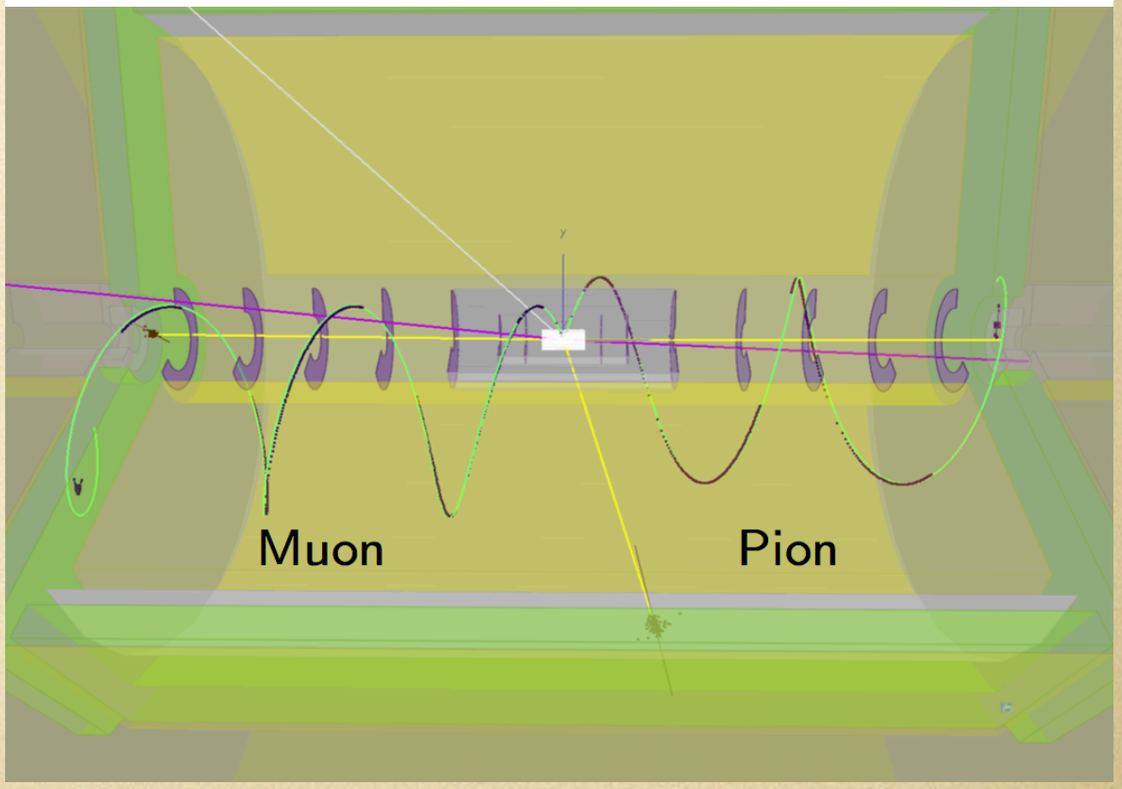
- (T.H.Tran, et. al, arxiv: 1510.0522) focused on the separation of τ decay modes, τ—>πν/ϱν/a_1ν, and the impact of ECAL inner radius
- very nice development, which can be used as a first step in Higgs CP benchmark, together with method of neutrino recovery by D.Jeans



low-p tracking and PID in Higgsino search

- an crucial role in ILC physics case
- few very soft and forward tracks
- take advantage of TPC continuous tracking
- significant development of PID using dE/dx and shower profile by M.Kurata and H.Sert; tools are now in final validation
- side remark: has impact on B-field (reconstruction efficiency is already only ~50% for ILD DBD)



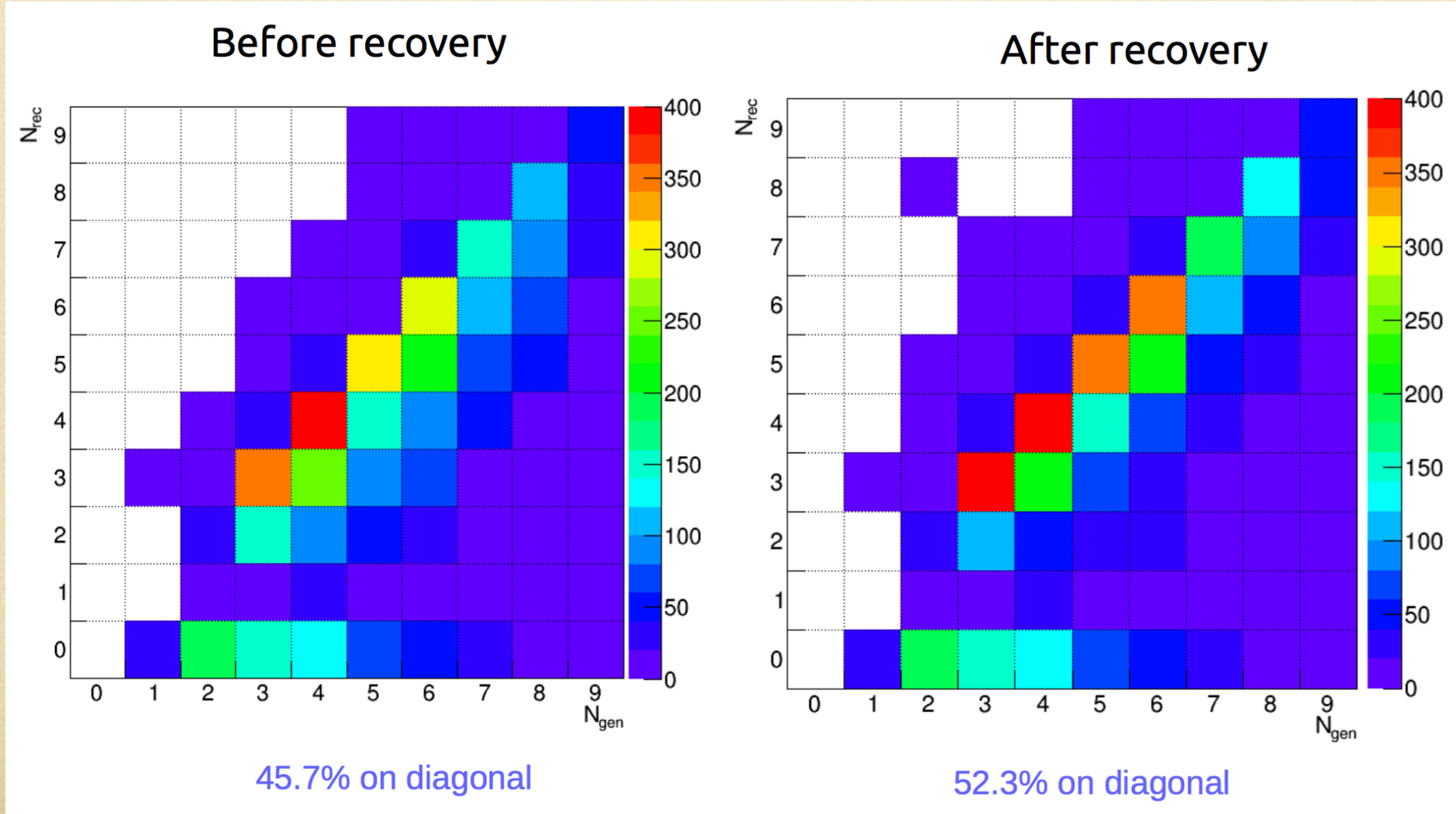


(H. Sert at ILD analysis/software meeting, Mar. 15)

vertex charge for A_{FB} in tt-bar

(S. Bilokin, et al, at High Level Reconstruction Workshop)

- using vertex charge for tt—>hadronic can improve a lot AFB
- significant effort has been put to understand the missing tracks, e.g. from PFA track selection, vertex finder; still ongoing, improvement already seen.



π^0 reconstruction in W mass

(G.Wilson, et al, at High Level Reconstruction Workshop)

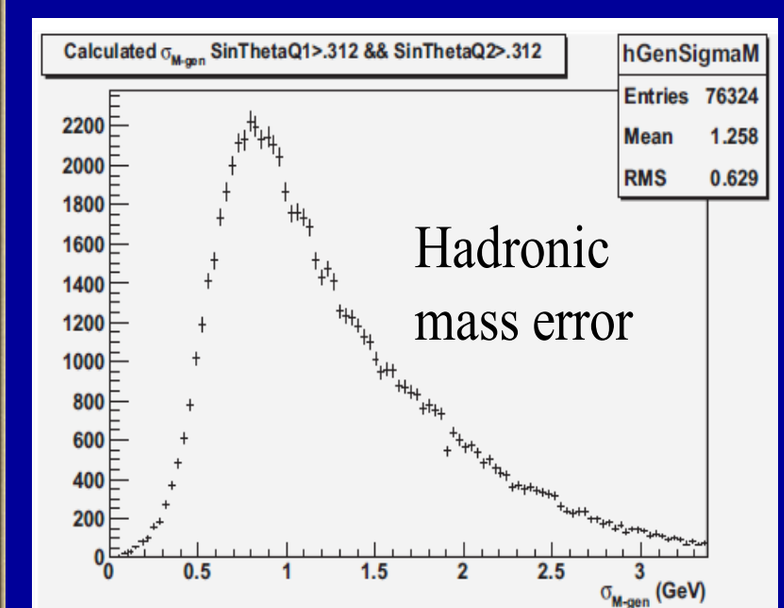
- identify photons from π^0 can improve jet energy resolution hence force W mass precision
- tools of photon rec., π^0 finder, π^0 fitter are essential; individual tool has almost been ready; further validation ongoing

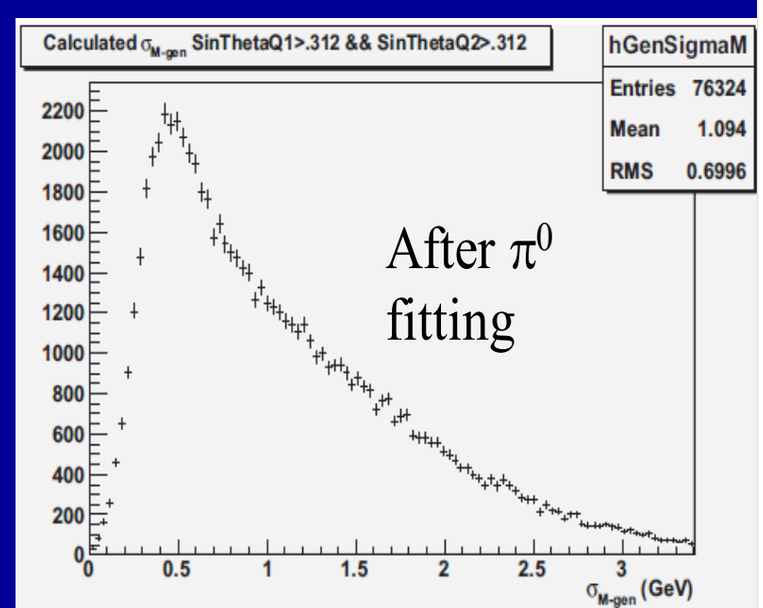
Event-Specific Hadronic Mass Resolution

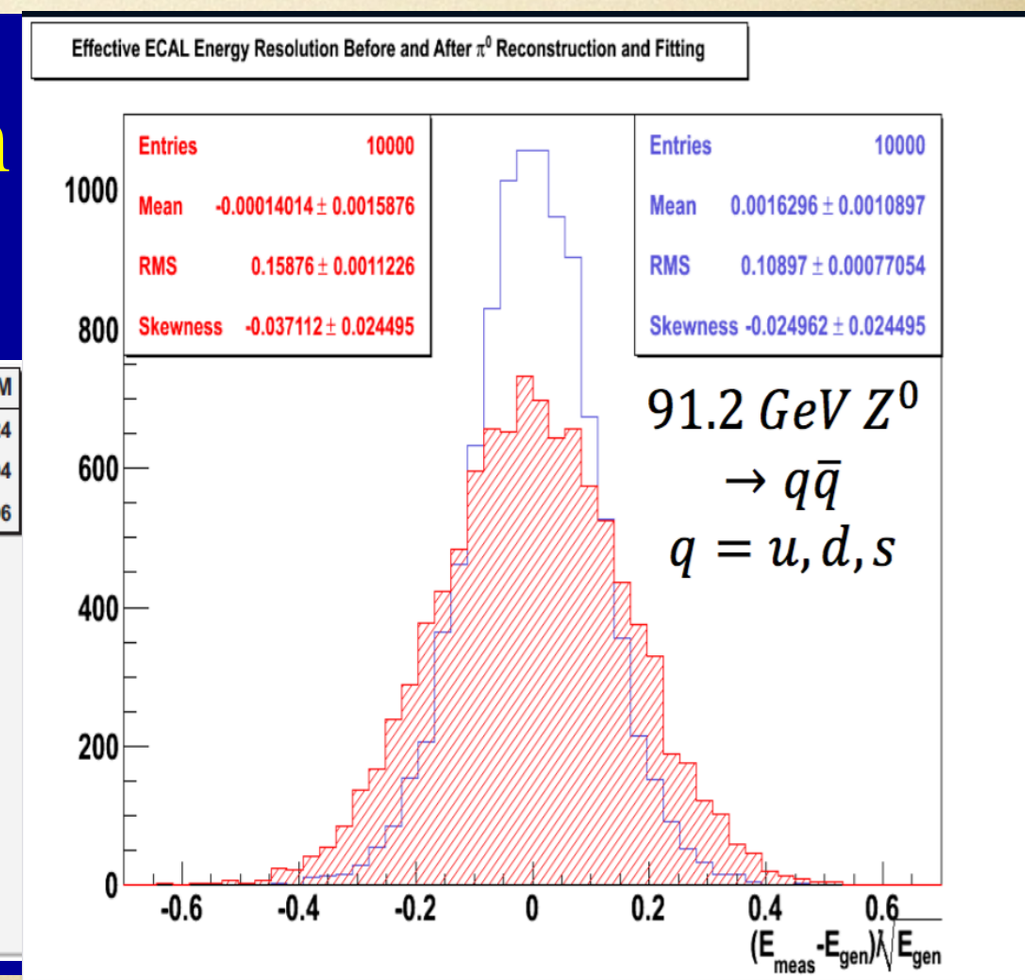
B. van Doren

$$e^+e^- \rightarrow u\bar{d}e^-\bar{\nu}_e$$

$\sqrt{s}$=500 GeV







C: status of systematics activities (experimental)

- systematics working group contact persons: M.Vos, G.Wilson, T.Suehara
- uncertainty of beam spectrum becomes possible common systematics for many analyses: tt-bar threshold, recoil mass, WIMP search, etc.; a task force on beam spectrum study shall be need shortly
- impact of beam induced background, in particular $\gamma\gamma$—>low-pt hadrons turns out to be important in many analyses; news: (talk by S.Sasikumar) modelling of $\gamma\gamma$—>low-pt hadrons has been investigated;
- ongoing: (J.Tian) improve overlay removal by finding the vertices of those $\gamma\gamma$ interactions —> need vertex finder for low-pt tracks
- news: (studies by K.Tsuchimoto) estimation of Z control samples for JES uncertainty; same things can be done for momentum calibration, flavour tagging eff. uncertainties, etc.

see some details in backup

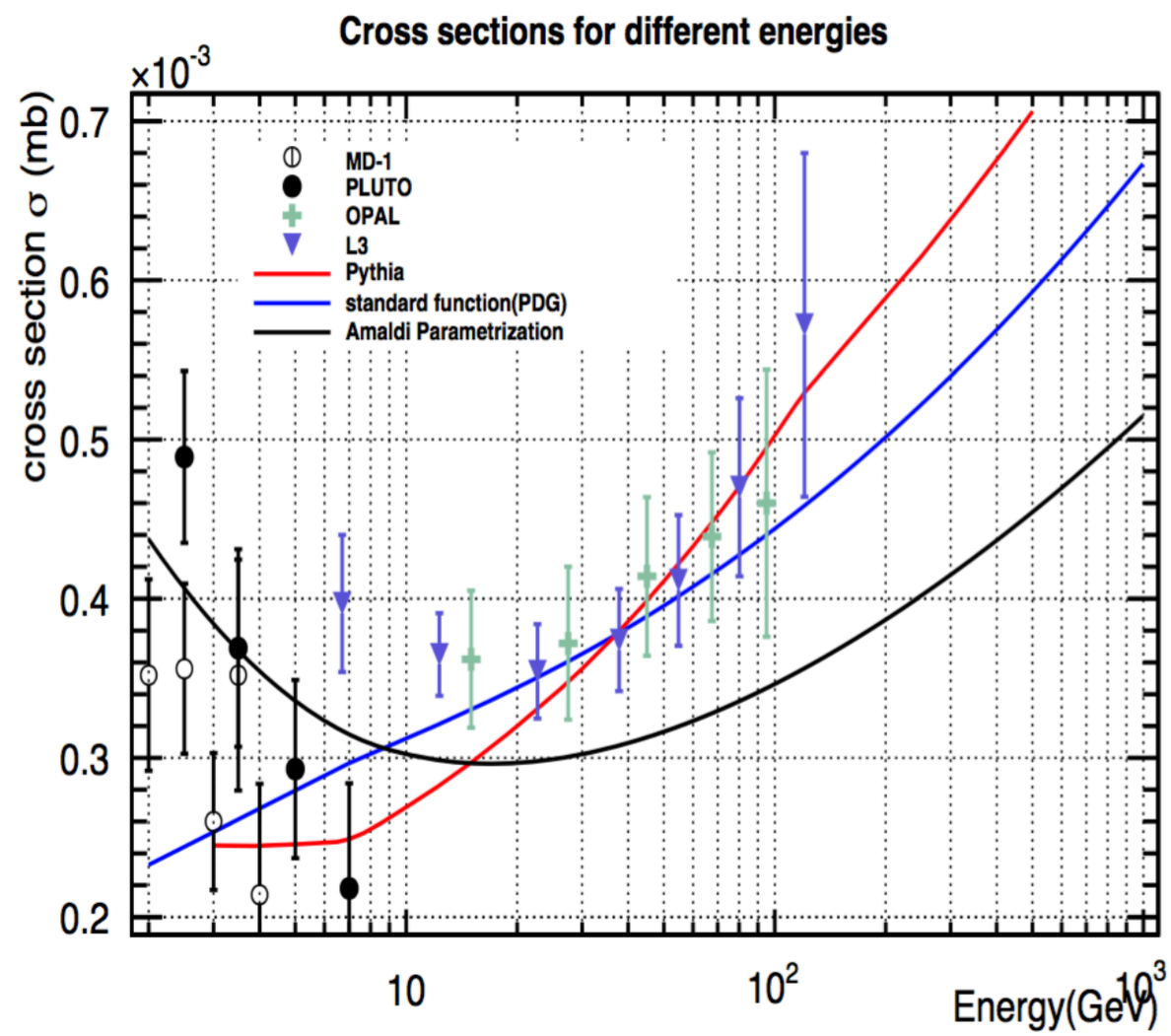
summary

- ILD analysis group is very active and productive
- analyses have been mainly focusing on making the ILC physics case, and are in good shape now; remaining issues have been pointed out in this talk and shall be worked on in next step
- benchmark processes for detector optimisation have been agreed on; main efforts on analyses in next step shall move to detector optimisation and the development of relevant tools
- enough attention shall be paid on studies of systematics
- apologies lots of analyses couldn't be mentioned

back up

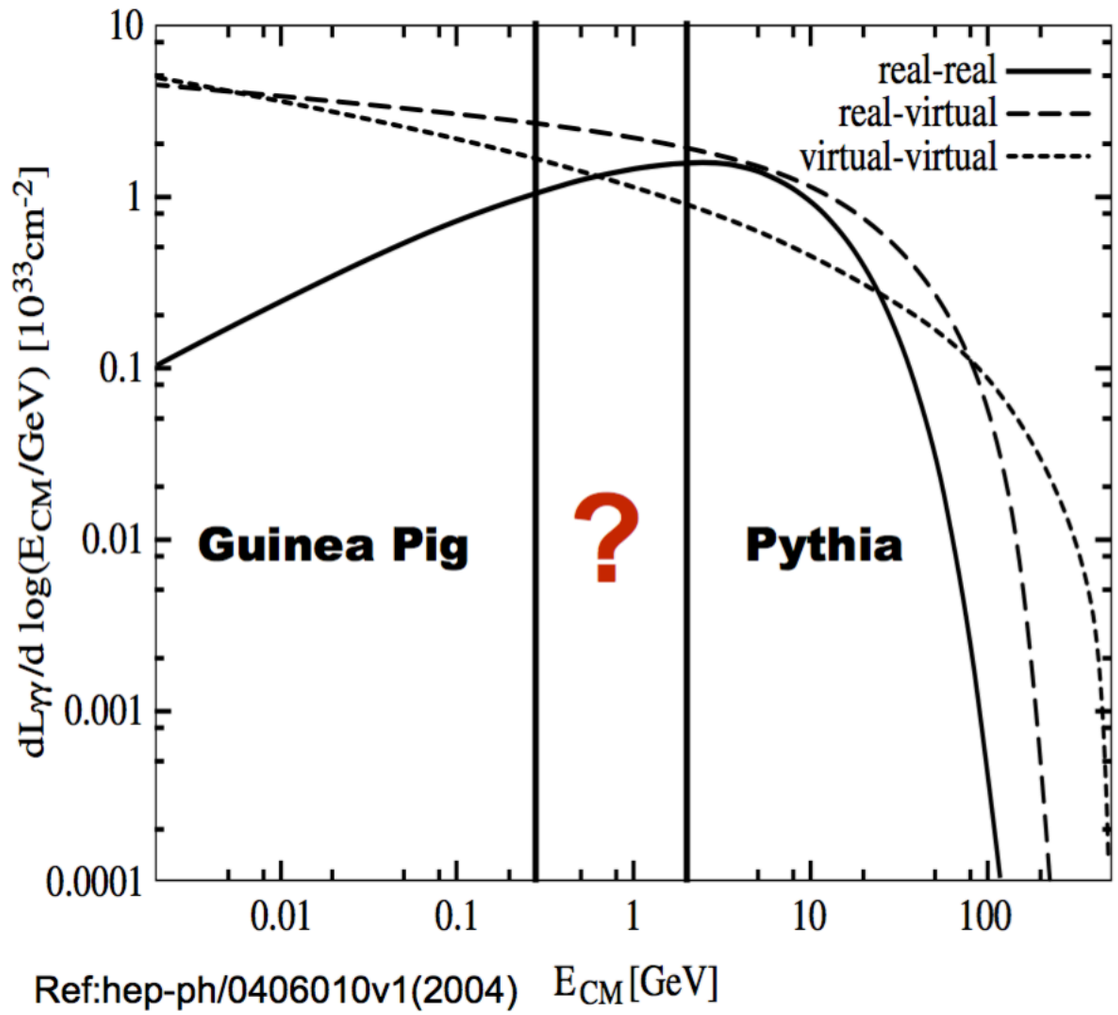
Total Cross Sections

- The results from Pythia very much in accordance with the standard function and the measured data.
- Data for gamma-gamma cross sections at very high energies not available
- Pythia seems to be quiet okay for evaluating gamma-gamma backgrounds



Shortcomings with Pythia

- Hadron productions initialized at 300MeV
- Crucial to understand processes at these energies
- Pythia cannot simulate for energies below 2.5GeV
- Trying for various solutions
  - By changing few parameters
  - Looking at Barklow's methods



Ref:hep-ph/0406010v1(2004)

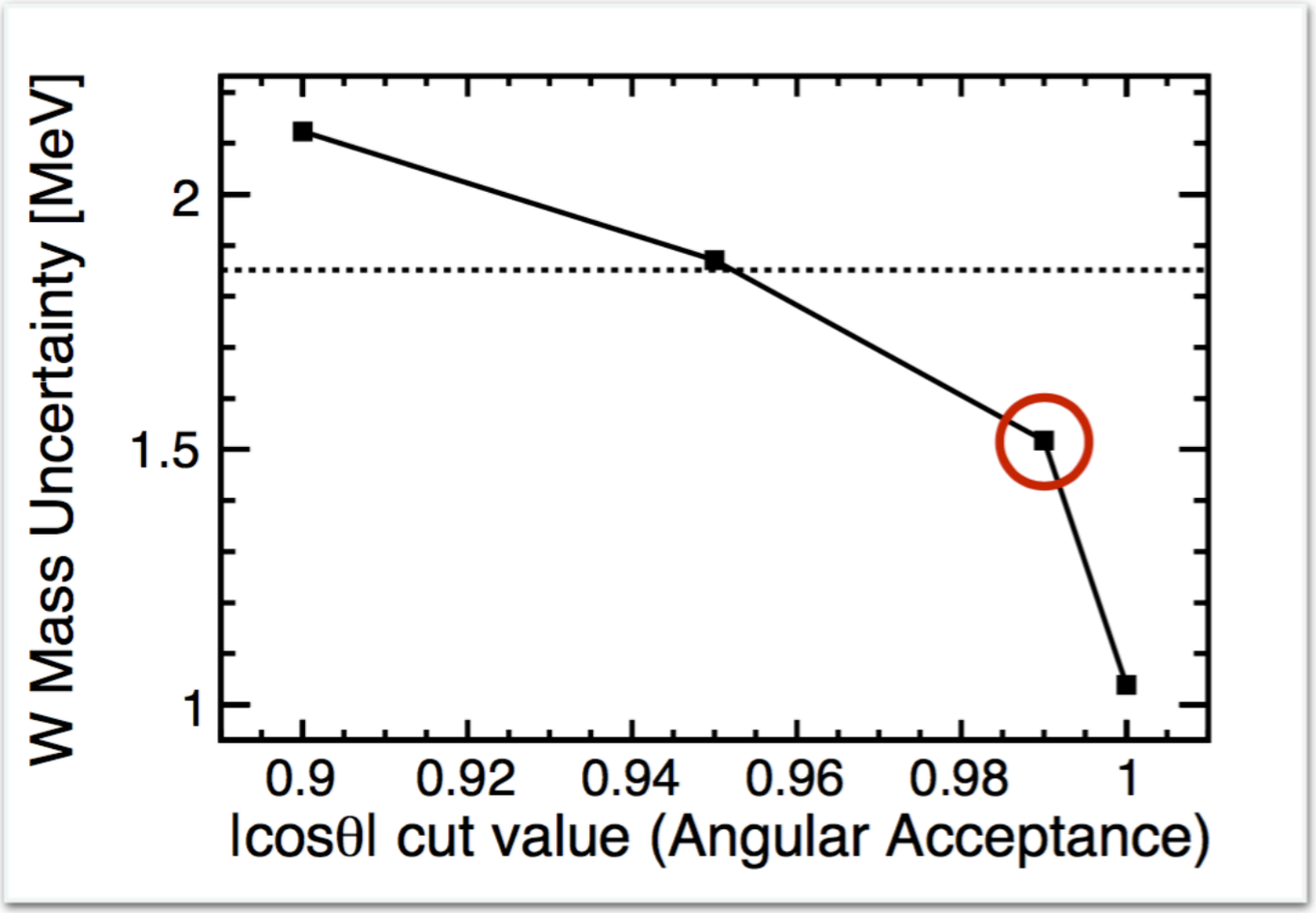
Available number of control samples

- Beam helicity configurations and total integrated luminosities for each E_{CM} are based on the ILC operation under the scenario H20.
- Be noted that in H20 scenario the total integrated luminosities are shared by different beam polarizations.
  - 250GeV : 67.5%(-0.8,+0.3), 22.5%(+0.8,-0.3), 5%(-0.8,-0.3), 5%(+0.8,+0.3)
  - 500GeV : 40%(-0.8,+0.3), 40%(+0.8,-0.3), 10%(-0.8,-0.3), 10%(+0.8,+0.3)
- Effective numbers resulting from the selection efficiencies for each process previously described.

E_{CM}	Process	N_{H20} [$\times 10^6$] (Z—>had.)	N_{eff} [$\times 10^6$] ($\lvert\cos\theta\rvert<0.99$)	N_{eff} [$\times 10^6$] ($\lvert\cos\theta\rvert<0.95$)	N_{eff} [$\times 10^6$] ($\lvert\cos\theta\rvert<0.90$)
250GeV	ZZ	0.25	0.11	0.1	0.09
	γZ	20	16	10	8.0
	ννZ	0.09	0.08	0.08	0.08
	eeZ	6.1	0.09	0.04	0.03
500GeV	ZZ	0.19	0.08	0.06	0.04
	γZ	9.7	6.2	3.9	3.0
	ννZ	0.83	0.73	0.73	0.73
	eeZ	13	0.15	0.07	0.04
Sum of All		50.0	23.5	15.4	12.0

(K.Tsuchimoto @ 44th general meeting of ILC physics subgroup)

Impact of detector acceptance on W mass



- plotted with the estimated W mass systematic error from JES uncertainty as the vertical axis and the value of detector acceptance as the horizontal axis
- dashed line indicates $\Delta M_Z/M_Z \sim 23$ppm (from LEP result)

11

(K.Tsuchimoto @ 44th general meeting of ILC physics subgroup)