



# **Report from Physics WG**

Keisuke Fujii  
on behalf of the Physics WG  
July 25, 2018

# **MEXT Review**

***The final report from the ILC Advisory Panel is open to the public now. The report is about 140 pages long and in Japanese. It will be translated (at least partially) into English.***

[http://www.mext.go.jp/b\\_menu/shingi/chousa/shinkou/038/gaiyou/\\_icsFiles/afieldfile/2018/07/19/1407245\\_1.pdf](http://www.mext.go.jp/b_menu/shingi/chousa/shinkou/038/gaiyou/_icsFiles/afieldfile/2018/07/19/1407245_1.pdf)

- ***The report has been sent back to the Science Council of Japan (for hopefully their endorsement).***

# ***ILD Physics WG***

# ***Status and Plan***

# **Benchmark Studies**

# Updated list of benchmarks

## Physics Benchmarks - reminder



**NN's!**

WG	Process	Physics	Detector	ECM	Who
Higgs & EW	H->bb	mass	JER, JES	500 GeV	Ali Ebrahimi (10%) + Junping Tian + NN
	ee->tautau	A_FB, tau-pol, A_LR	2D rec.	500 GeV	Daniel Jeans + <a href="#">Kenta Yumino</a>
	H->mumu	BR	momentum resolution	500 GeV	Shin-ichi Kawada + NN
	H->invisible	BR limit	JER, hermeticity	500 GeV	<a href="#">Taku Kato</a> + NN
	VW->qqlv	MW, TGCs, beam pol.	JES, JER, electron, mu	500 GeV	<a href="#">Justin Angeliano, Mila Pandurovic</a>
	vvqqqqq	TGCs	JES, JER	1 TeV	Jakob Beyer + NN
Top, BSM & SCD	gamma Z->qqe / mu mu	A_LR, sigma_tot, LS	photon, JER/JES, e, mu	500 GeV	<a href="#">Takahiro Mizuno</a> + JT
	tt->bbqqqq	x-section, AFB	b-tag, vertex charge, PID	500 GeV	Sohail Amjad, <a href="#">Adrian Irles</a> , <a href="#">Yuichi Okugawa</a> + RP, RY
	H->bcc/gg	BR	c-tag, b-tag, JER	500 GeV	<a href="#">Ryo Yonamine</a> + <a href="#">Masakazu Kurata</a>
BSM	low deltaM Higgsinos	natural SUSY	low-p tracking, PID, hermeticity	500 GeV	Swathi Sasikumar + JL/MB
	mono-photons	WIMPs / WISPs	photon reco, BeamCal	500 GeV	<a href="#">Ahmed Mustahid</a> + RY
	Zh, mh < 125 GeV	limit on ZZh coupling	p res, e reco, JER, hermeticity	500 GeV	Yan Wang + JL/MB

One more new name assigned to some active supervisors rather than active analyzers, so we need more analyzers almost everywhere.

***We strongly request all the  
people working on physics  
analyses to proactively  
contribute to the  
benchmark analyses for  
the new 500 GeV samples  
as much as possible!***

# On-going actions

**To facilitate benchmark analyses, PCs are trying to**

- **enrich *confluence pages for benchmark processes* contacting analyzers.** → *Most analyzers got accounts or in the process to do so.*
- **An *analysis code repository (GitHub)* is ready now for individual benchmark analyses with templates.** → *Most analyzers got accounts or in the process to do so.*
- **monitor and help, if needed, individual benchmark analyses:**
- **encourage analyzers to make status reports on their benchmark analyses and tools in a S&A meeting:**  
***Today***
  - ***Masakazu: LCFIPlus***
  - ***Mustahid, Ryo: mono-photon***



# Webpages for Benchmarks

- <https://confluence.desy.de/display/ILD/Benchmarks+for+physics-driven+detector+optimisation>
- currently maintained by the physics WG conveners
- evolving
- will be handed over to responsible analysis persons later

Screenshot of an Atlassian Confluence page titled "WIMPs in mono-photon channel". The page is part of the "Benchmarks for physics-driven detector optimisation" space.

**Short description:**  
The search is for pair-produced WIMPs, where the presence of the interaction is detected by the observation of an ISR photon and nothing else. At ILC (but not LHC) this kind of interaction can be described in a almost model-independent way with EFT. Apart from the obvious ee → nu nu + ISR reducible background, also ee → ee (down the beam-pipe) + ISR are the backgrounds. No dedicated signal simulation is needed; one can simply reweight the ee → nu nu + ISR gamma-spectrum (as a function of theta and E\_gamma) to be that of any signal.

This benchmark in particular can probe two features:

- Photon detection and measurement.
- Helicity, in particular the performance of the very forward calorimeters.

**Main observables:**  
The main (and only) direct observable for the signal is the momentum of the ISR photon. The physics observable is the exclusion/discovery WIMPs in the mediator-mass/coupling plane for different Lorentz-structures of the interaction.

**Optimisation deliverables:**  

- Gamma detection efficiency at all angles, in all relevant calorimeters.
- Rejection power of the very forward calorimeters against other activity than the ISR.

**People:**  
Main investigator: Ahmed Mustafa, assisted by Ryo Yamane

**References:**  
Previous analyses by Christoph Belits & al.: Characterising WIMPs at a future e+e- Linear Collider, arXiv:1206.6620. Finishing study by Moritz Habermann & al.: WIMP searches at the International Linear Collider PoS ICHEP2016 (2016) 158, arXiv:1702.05377

No labels

Powered by Atlassian Confluence 6.1.1 · Report a bug · Atlassian News

Atlassian

- **For confluence pages:**  
*Analyzers, please get write permission, if not yet, to corresponding confluence pages from Ties or Frank.*
- **For the analysis code repository:**  
*Analyzers, please send a GitHub account name to Jenny.*
- **Thanks to PSB, reviewers for individual benchmark analyses have been nominated.**  
***Thanks also to reviewers for accepting the role.***

WG	Process	Physics	Detector	ECM	Analyzers	Reviewers
Higgs & EW	H->bb	mass	JER, JES	500 GeV	Ali Ebrahimi (10%) + Junping Tian + <b>NN</b>	<b>Frank Simon</b>
	ee->tautau	A_FB, tau-pol, A_LR	tau-reco	500 GeV	Daniel Jeans + <b>Keita Yumino</b>	<b>Taikan Suehara</b>
	H->mumu	BR	momentum resolution	500 GeV	Shin-ichi Kawada + <b>NN</b>	<b>Ivanka Bozovic, Alexander Filip Zarnecki</b>
	H->invisible	BR limit	JER, hermeticity	500 GeV	<b>Yu Kato + NN</b>	<b>Marcel Vos</b>
	WW->qqlv	MW, TGCs, beam pol.	JES, JER, electron, mu	500 GeV	<i>Justin Anguiano, Mila Pandurovic</i>	<b>Klaus Desch, Subhasish Behera</b>
	vvqqqqq	QGCs	JES / JER	1 TeV	Jakob Beyer + <b>NN</b>	<b>Mikael Berggren</b>
<b>gamma Z-&gt;qq/ee/mumu</b>		<b>A_LR, sigma_tot, JES</b>	<b>photon, JER/JES, e, mu</b>	<b>500 GeV</b>	<i>Takahiro Mizuno + JT</i>	<b>Matthew Wing</b>
Top, Bottom & QCD	tt->bbqqqq	x-section, AFB	b-tag, vertex charge, PID	500 GeV	Sohail Amjad, <i>Adrian Irles, Yuichi Okugawa + RP, RY</i>	<b>Marcel Vos</b>
	<b>H-&gt;bb/cc/gg</b>	<b>BR</b>	<b>c-tag, b-tag, JER</b>	<b>500 GeV</b>	<i>Ryo Yonamine + Masakazu Kurata</i>	<b>Hiroaki Ono</b> <b>Frank Simon</b>
BSM	low deltaM Higgsinos	natural SUSY	low-p tracking, PID, hermeticity	500 GeV	Swathi Sasikumar + <b>JL/MB</b>	<b>Akimasa Ishikawa</b>
	mono-photons	WIMPs / WISPs	photon reco, BeamCal	500 GeV	<i>Ahmed Mustahid + RY</i>	<b>Alexander Filip Zarnecki</b>
	Zh, mh < 125 GeV	limit on ZZh coupling	p res, e reco, JER, hermeticity	500 GeV	Yan Wang + <b>JL/MB</b>	<b>Kiyotomo Kawagoe, Junping Tian</b>

# *Proposed S&A meeting schedule*

**Jul. 25: KF**

Aug. 8: Jenny

Aug. 22: Frank

Sep. 5: Frank

Sep. 19: KF

***Weekly physics conveners' meeting every Tuesday  
at 13:00 CERN time with no summer break***

**Conveners' ML:**

[ild-physics-conveners@desy.de](mailto:ild-physics-conveners@desy.de)

***Use this mailing list to send your talk request.***

# ***3-day Pre-meeting to LCWS in Arlington***

***Date: Oct. 19-21***

***Expected attendee:***

- ***physics and software conveners***
- ***benchmark analyzers***
- ***benchmark reviewers***
- ***others***

***Please book your flights accordingly!***