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1. First Look at the Physics Case of TLEP[TLEP Design Study Working Group](#) (M. Bicer ([Ankara U.](#)) *et al.*). Aug 28, 2013. 49 pp.Published in **JHEP 1401 (2014) 164**DOI: [10.1007/JHEP01\(2014\)164](#)Conference: [C13-07-29.2 Proceedings](#)e-Print: [arXiv:1308.6176 \[hep-ex\]](#) | [PDF](#)[References](#) | [BibTeX](#) | [LaTeX\(US\)](#) | [LaTeX\(EU\)](#) | [Harvmac](#) | [EndNote](#)[CERN Document Server](#); [ADS Abstract Service](#); [Link to PDF on ECONF](#); [Link to Proceedings write-up on ECONF](#); [Link to Article from SCOAP3](#)[Detailed record](#) - Cited by 503 records **500+**

Famous paper now!

HEP

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1. Measuring the top-quark mass in $t\bar{t}$ + 1-jet topologies with the ATLAS detector at the LHCMedida de la masa del quark top en eventos de topología $t\bar{t}$ + 1-jet en el experimento ATLAS de LHC[Davide Melini](#).[References](#) | [BibTeX](#) | [LaTeX\(US\)](#) | [LaTeX\(EU\)](#) | [Harvmac](#) | [EndNote](#)[Link to Fulltext](#)[Detailed record](#)**2. Analytic Next-To-Leading Order Calculation of Energy-Energy Correlation in Gluon-Initiated Higgs Decays**[Ming-xing Luo](#), [Vladyslav Shtabovenko](#), [Tong-Zhi Yang](#), [Hua Xing Zhu](#). Mar 18, 2019. 34 pp.e-Print: [arXiv:1903.07277 \[hep-ph\]](#) | [PDF](#)[References](#) | [BibTeX](#) | [LaTeX\(US\)](#) | [LaTeX\(EU\)](#) | [Harvmac](#) | [EndNote](#)[ADS Abstract Service](#)[Detailed record](#)**3. Dark Matter through the Higgs portal**[Giorgio Arcadi](#), [Abdelhak Djouadi](#), [Martti Raidal](#). Mar 8, 2019. 260 pp.

LAPTH-010/19

e-Print: [arXiv:1903.03616 \[hep-ph\]](#) | [PDF](#)[References](#) | [BibTeX](#) | [LaTeX\(US\)](#) | [LaTeX\(EU\)](#) | [Harvmac](#) | [EndNote](#)[ADS Abstract Service](#)[Detailed record](#)

FCC and ILC

We had a special FCC Coordination Group Meeting in presence of DG (F. Gianotti) and DA (director for accelerators F. Bordry) Monday 18 March. Here are the main points

- DG summarized situation with ILC
 - no commitment from Japanese government
 - MEXT declared interest in ILC for the first time (this is new) and will seek discussions with governments (KEK DG charged with contacts)
 - ICFA acknowledges the above, regrets the lack of commitment, reiterates support, but also praised the fact that other Higgs factory proposals have matured. (This is new)
 - likely that funding agencies will wait for Japan commitment and ESPP conclusions.
- under these conditions it will be impossible to ignore ILC in the strategy.

NB you can find the latest ICFA statement here:

https://icfa.fnal.gov/wp-content/uploads/ICFA_Tokyo_Statement_March2019.pdf

-- DA stresses that we should stop discussing ILC and concentrate on FCC!

-- CERN's future (either FCC or CLIC) IS THE FIRST PRIORITY, and cannot be jeopardized by non-committal statements

this is the translation
of the MEXT statement

Interest is expressed but
several conditions still need
to be met!

MEXT's view in regard to the ILC project
Executive Summary

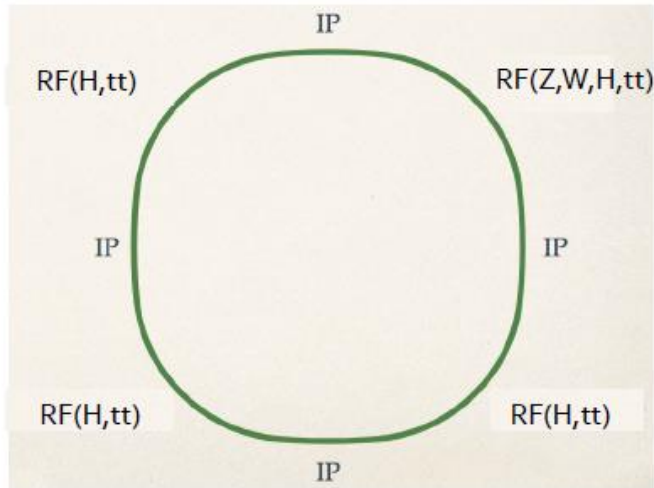
March 7, 2019
Research Promotion Bureau, MEXT

- Following the opinion of the SCJ, MEXT has not yet reached declaration for hosting the ILC in Japan at this moment. The ILC project requires further discussion in formal academic decision-making processes such as the SCJ Master Plan, where it has to be clarified whether the ILC project can gain understanding and support from the domestic academic community.
- MEXT will pay close attention to the progress of the discussions at the European Strategy for Particle Physics Update.
- The ILC project has certain scientific significance in particle physics particularly in the precision measurements of the Higgs boson, and also has possibility in the technological advancement and in its effect on the local community, although the SCJ pointed out some concerns with the ILC project. Therefore, considering the above points, MEXT will continue to discuss the ILC project with other governments while having an interest in the ILC project.

FCC next....

- meanwhile (and because question is asked) an assessment will be made of the possibility to equip FCC ring with LHC-type magnets (8T) (cost, performance, physics)
- **Go to ESU**, and fight for what is best for Europe (DG).
 - Green light for the 100 km tunnel is a mandatory outcome from ESU.
- the baseline FCC (ee and hh) ***is*** the FCC proposal to the ESPP
 - this is still not a very well known fact!
 - and we should work hard to continue to enlarge the community support
 - we (AB, PJ) meet with M. Benedikt next wednesday to discuss this
 - study of FCC-ee with 4-IP -- performance and feasibility has started.
 - much progress taking place in MDI (see next talks)
 - software and applications such as tracking, reconstruction, PID, vertex tagging (b,c, tau) are now high priorities.
 - contact us (Alain+Patrick)

Studies about 4 IPs started (K. Oide)



- ✦ Equal spacing between IPs:
 - ✦ Otherwise more than 4 bunches couple together.
- ✦ Complete period 4 periodicity, including RF (at least at ttbar):
 - ✦ Better beam-beam, dynamic aperture, etc.
- ✦ RF must be at the midpoint of 2 IPs:
 - ✦ Beams cross over at the RF.

Next in line

- Dynamics full simulation
- Price increase
- Compatibility with FCC-hh
- Compatibility with injection
- ...

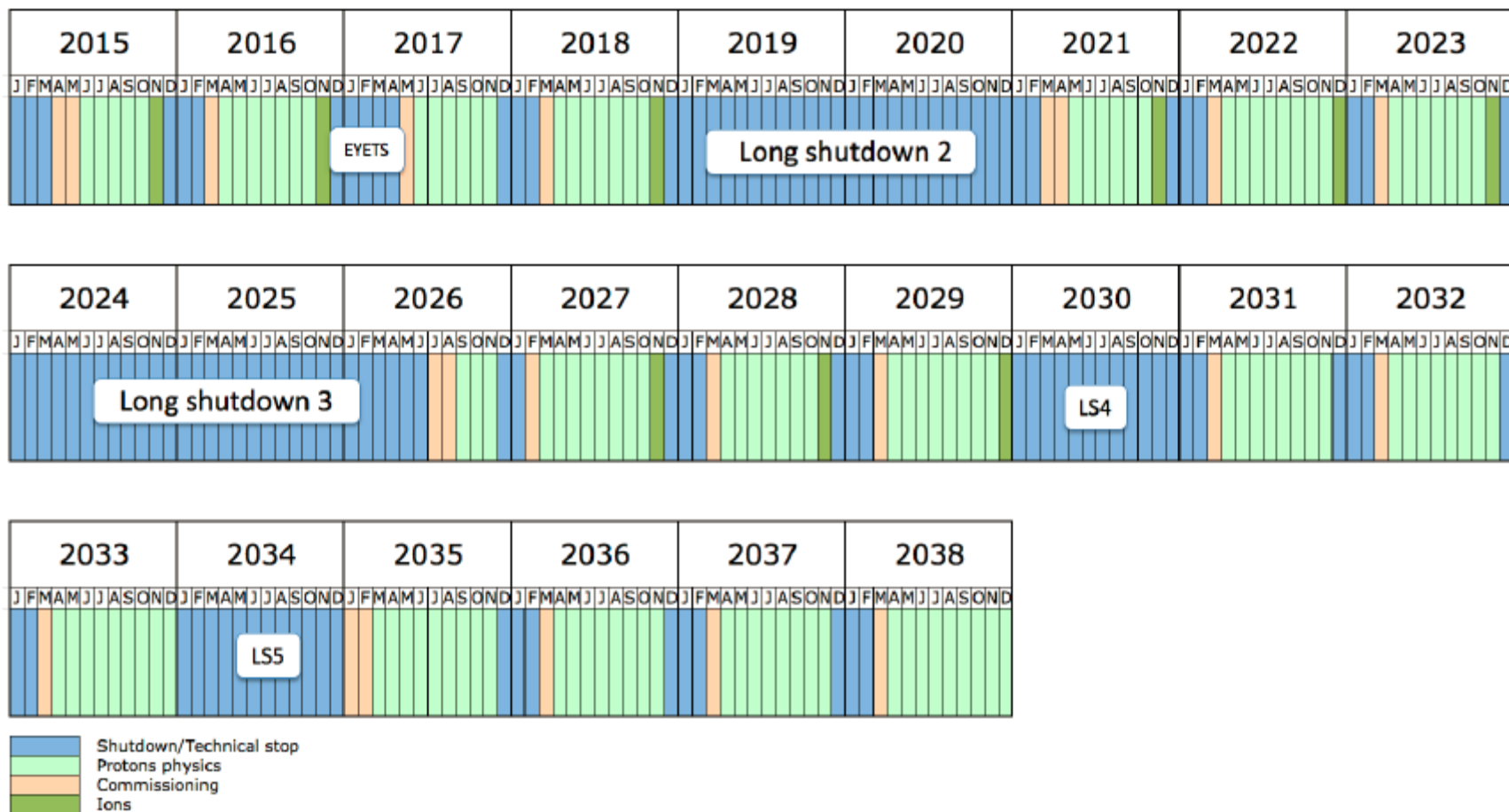
Rough estimation of luminosity

	Z		tt	
# of IPs	2	4	2	4
Particles/bunch [10^{11}]	1.7		2.3	
Bunches/beam	16640		48	
$\beta^*_{x/y}$ [m/mm]	0.15/0.8		1/1.6	
Long. damping [turns]	1270		40.8	
σ_z (SR/BS) [mm]	3.51/11.4	3.51/ 13.0	1.96/2.54	1.96/ 2.80
σ_δ (SR/BS) [%]	0.038/0.123	0.038/ 0.141	0.150/0.194	0.150/ 0.215
$\xi_{x/y}$	0.004/0.148	0.003/0.129	0.098/0.141	0.089/0.136
Luminosity/IP [$10^{34}/\text{cm}^2\text{s}$]	230	201	1.40	1.31

- ✦ Above are just geometrical calculations: no dynamics involved.
- ✦ Real estimation will be soon given by D. Shatilov & K. Ohmi including flipflop & beam-beam instabilities.

FCC and HL-LHC

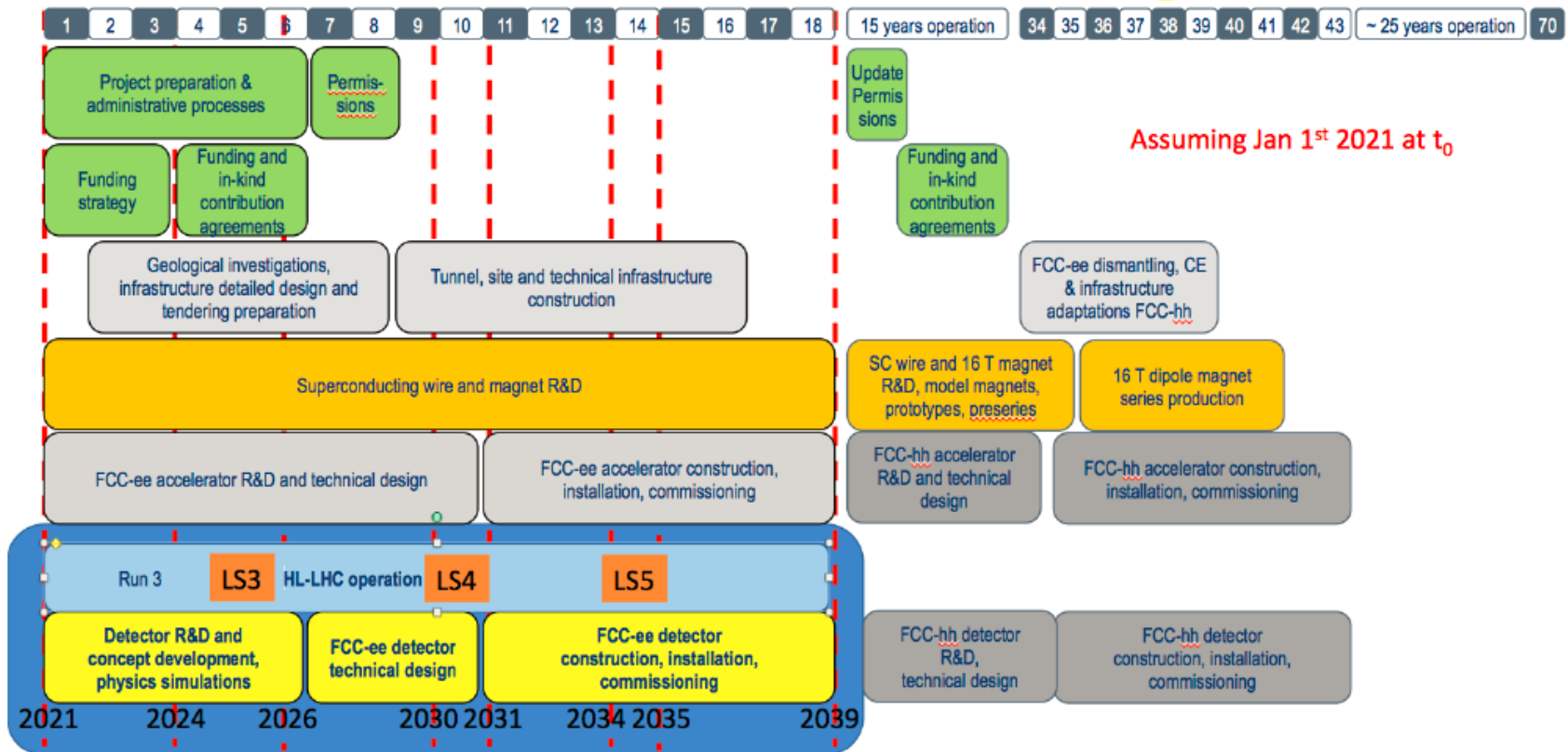
The integrated FCC (ee+hh) triggered worries in LHC experiments



FCC and HL-LHC

From HL-LHC towards FCC-ee

□ Detector collaborations and technical design



The hard work towards FCC-ee (TDRs) to take place after commissioning of HL-LHC upgrades running HL-LHC and FCC-ee on a same year are not necessarily incompatible

... but not foreseen now

FCC-ee Physics and Experiments until 2021

□ We propose the creation of a P&E Programme Advisory Committee

Proposal

Under discussion with Guenther and Michael

We propose the creation of a “FCC-ee Physics & Experiments Programme Advisory Committee (P&E PAC)”, in order to get initial guidance in each of the aspects of the FCC-ee Physics and Experiments (P&E) studies (which include the definition of the organizational chart, the construction of the software for detector simulation and physics performance, the theory calculations, the detector R&D and prototyping,....), and contacts with each of the participating countries. A certain overlap in membership between this P&E PAC and the FCC International Advisory Committee (IAC) is envisioned, complemented with additional experts that are not members of the IAC.

The FCC-ee P&E PAC would meet regularly to hear the status of the study and, upon request or spontaneously, give advice and suggestions to the FCC-ee P&E coordination for contributors in the various countries. The PAC shall also be consulted when setting up the agenda and the list of speakers for these FCC weeks and FCC Physics weeks.

Once a year, the FCC-ee P&E PAC shall review the scientific and technical progress of the study and shall submit recommendations to the FCC-ee P&E coordination during FCC weeks or FCC Physics weeks, after consultation with the IAC chairperson. The mandate would be for two years (2019-2020), since it is expected – if the ESU concludes that the FCC integrated project should be supported – to have another phase transition with the kick-off of the actual technical study of the FCC-ee at the beginning of 2021.

this might continue after 2021 but another phase transition is likely to happen in 2021. A list of national contact is being drafted, please let us know if you have suggestions.

Other news and meetings

The symposium: **Physics at FCC: overview of the Conceptual Design Report** had 265 participants (up to 95 on air, up to 200 in the room)

<https://indico.cern.ch/event/789349/>

slides are a good source of information for talks!

It will be essential to attend the **ESPP meeting in Granada** and speak up.

<https://indico.cern.ch/event/795908/>

preliminary agenda is posted.

FCC week in Brussels → register asap.

<https://fccweek2019.web.cern.ch/>

FCC WEEK 2019

FUTURE CIRCULAR COLLIDER
CONFERENCE

BRUSSELS, BELGIUM

24-28 JUNE 2019

WRITING
the FUTURE

FCC Week in Brussels (24-28 June)

Version: 0.8		Date: 18.02.2019		FCC Week 2019 Programme																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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08:30-09:00	Registration @ Palace Lobby (Ground floor)	Opening, study status and physics perspectives	Welcome (Speaker, ORG)	EuroCirCol machine design WP2	SC RF cavities and technologies	FCC physics & experiments	Economics of Science Workshop	FCC-ee machine design	EuroCirCol cryo-beam vacuum design WP4	FCC physics & experiments	Beam transfer systems and beam dumps R&D status	FCC-ee MDI design	Conductor R&D Nb3Sn	FCC physics & experiments	Implementation aspects	Summaries machines and technologies	FCC-ee machine design	08:30-09:00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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11:00-11:30		EuroCirCol results	EuroCirCol WP2+3 FCC-ee design	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Summaries physics and experiments	11:00-11:30																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
11:30-12:00			EuroCirCol WPM - Vacuum system	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	Chairperson (ORG)	FCC-ee physics & experiments	11:30-12:00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
12:00-12:30		Chairperson (ORG)	EuroCirCol WPS - 16 T Magnets	Steering Committee (closed meeting)		Lunch (Restaurant & Brasserie, Ground floor)				Lunch (Restaurant & Brasserie, Ground floor)				International Advisory Committee (closed meeting)		Lunch (Restaurant & Brasserie, Ground floor)		Chairperson (ORG)	FCC-ee physics & experiments	12:00-12:30																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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- **First thoughts for 12 sessions of 90 mins each (Tue, Wed, Thu)**
 - ◆ Theory precision SM : 2 sessions
 - Proposed conveners: J. Gluza, A. Freitas
 - ◆ Theory BSM and global fits : 1 session
 - Proposed conveners: M. McCullough, J. de Blas
 - ◆ Precision measurements, Energy Calibration, Luminosity Measurement : 2 sessions
 - Proposed conveners: R. Tenchini, J. Wenninger
 - ◆ Detector technologies and proposals (ee/hh) : 2 sessions
 - Proposed conveners: M. Dam, W. Riegler
 - ◆ Software and simulations : 1 session
 - Proposed conveners: C. Helsens, P. Mato
 - ◆ Machine-Detector interface : 2 sessions
 - Proposed conveners: M. Boscolo, N. Bacchetta
 - ◆ Flavour, QCD, top : 1 session
 - Proposed conveners: P. Azzi, S. Monteil
 - ◆ Higgs : 1 session
 - Proposed conveners: C. Grojean, K. Peters

Most conveners have accepted

TOPICS FOR WORK (LIST = WORK IN PROGRESS) – 2 --

Machine-Detector Interface and Energy calibration

- Mechanical design for beam-pipe + luminosity calorimeter + vertex detector
- Beam background studies in the IDEA drift chamber
- Possibility of a smaller beam pipe up to 240 GeV - impact on flavour tagging
- Progress with MDI-Sim
- Final focus system (sextupoles)
- Z gamma at 160 GeV (calibration) and 240 GeV with detector simulation
- Use of muon momentum measurement for the point-to-point energy error

Contributions to the “turn-key” software, FCCSW

- Develop the IDEA simulation and reconstruction in FCCSW
 - Vertex detector + vertexing
 - Drift Chamber + tracking
 - Dual readout calorimeter + clustering
 - b- and c-tagging
 - Particle Flow reconstruction
- Port some of the LCSOft software tools to FCCSW
- Port CLD simulation to FCCSW (could this be done by CLIC people?)
- Start simulation of new detector concepts
 - Liquid Argon calorimeter from FCC-hh
 - Start developing or use algorithm developed for IDEA

TOPICS FOR WORK (LIST = WORK IN PROGRESS) – 3 --

Theoretical calculations (see long list in <https://arxiv.org/abs/1809.01830>)

Physics studies (exp. + th.)

- Electroweak physics at the Z pole

 - Influence of IFI on forward backward asymmetry and α_{QED}

 - Space like measurement of α_{QED} with low angle Bhabha

 - Effective mixing angle from tau polarization measurement

 - Starting with the tau $\rightarrow \rho \nu$ channel

 - Rb with realistic b tagging

 - b asymmetry with the simpler lepton channel

 - Phenomenology: WWgamma TGC in the $e^+e^- \nu_e \nu_e \gamma$ channel

- Diboson physics

 - Systematic uncertainties on TGC measurements

 - EFT fit beyond TGC dominance assumption

- Higgs studies

 - Measurement of Higgs boson to b, c, g with detector simulation

 - CP studies in tau lepton decays

Global EFT fit (EWPO, diboson, Higgs) to emphasize the correlations and the importance of Z pole run in Higgs coupling extraction.

- Top quark studies

- QCD

TOPICS FOR WORK (LIST = WORK IN PROGRESS) – 4 --

Flavours

CKM Physics - NP in $DF = 2$

Bs to tau tau

Bc to tau nu

CPV in B mixing

...

tau physics branching ratios and tests of universality

BSM physics

neutrinos

Axion-Like-ParticleS

...

Communication

Maintenance and development of the FCC-ee web site

???

-- Collaboration guidelines are being drafted

main points:

- world wide effort to study and design the circular e+e- electroweak factory
- transition : {Information & good-will} → {MOU + commitment}
 - important to levy resources and real work
 - ensure real support and commitment from institutes
 - also this will allow use of latest, supported software, algorithms etc..

some boundary conditions

- do not give numbers or results in public if they are not documented!
 - may need to protect indico pages for meetings etc...
 - need volunteers for web site, repositories etc...
-
- Program Advisory Committee for FCC-ee physics and experiments studies
as body of the International Advisory committee chaired by **G. Dissertori**

➔ now that we have done the CDR.....

LET US MAKE FCC A SUCCESSFUL REALITY!