



Next plans for FCC-ee

- e+e- physics: 'every event is signal'
- quality of FCC-ee experiments are intimately related to accelerator performance
 - available energy points
 - Luminosities
 - beam polarization and energy calibration
 - knowledge of beam other parameters (e.g. energy spread)
- we can (mostly out of LEP experience) project fairly well the experimental precisions sometimes they are vertiginously small
 - ex: $\Delta \sin^2\theta_W^{\text{eff}} = 5 \cdot 10^{-6}$, $\Delta m_Z = 0.1 \text{ MeV}$ $\Delta m_W = 0.5 \text{ MeV}$ $\Delta\sigma_{ZH} / \sigma_{ZH} \sim 10^{-3}$ etc...
 - please use these ! as Roberto emphasized, common uncertainties such as $\Delta\alpha$ can be eliminated by combination of several observables.
- it remains that full use of precision measurements requires a considerable improvement in the theory calculations
 - for the measurements themselves (e.g. Full two loops exponentiated for the QED ISR)
 - for the interpretation; full three loop calculations for EWRCs and on inputs ($\Delta\alpha_{\text{QED}}(m_Z)$)

need to work hand-in-hand



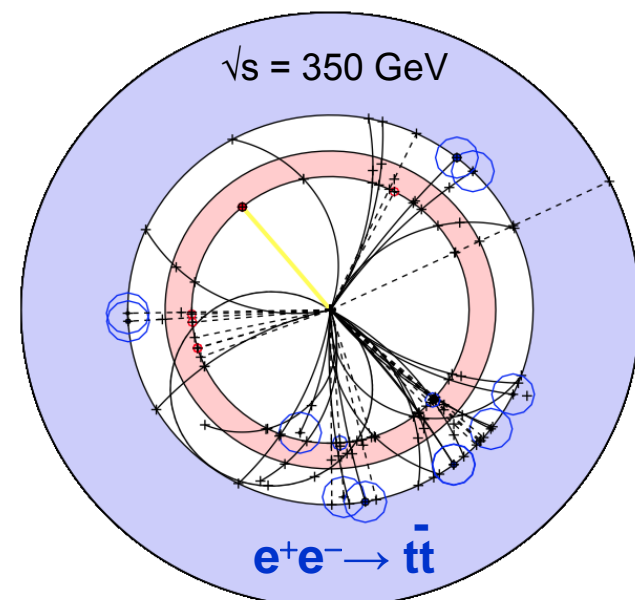
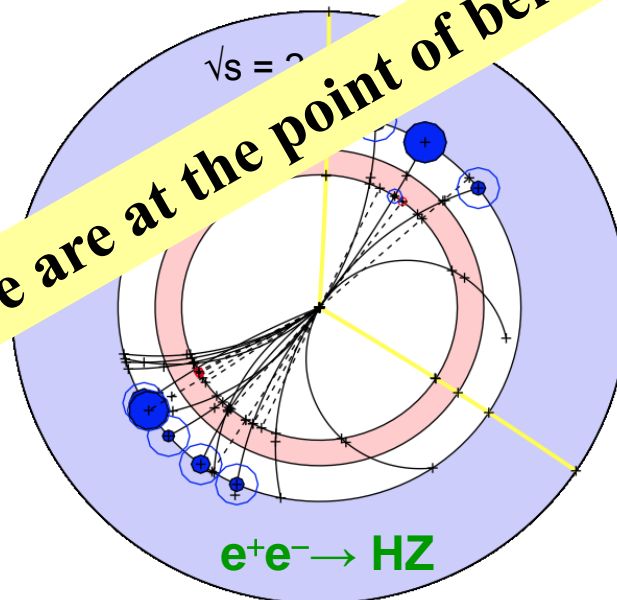
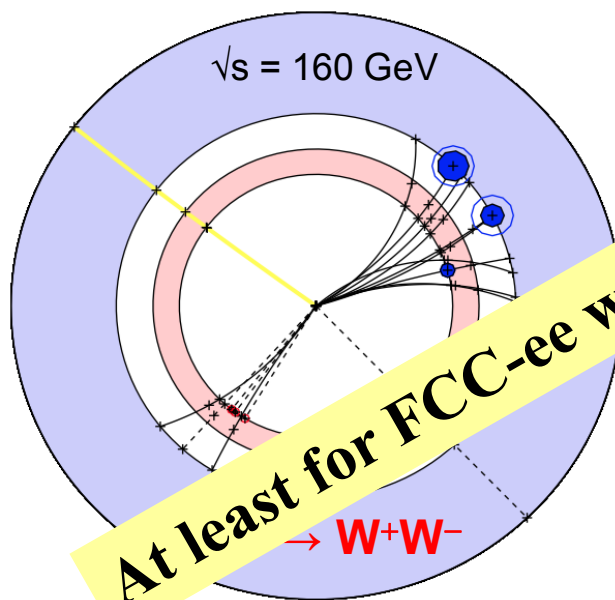
Activities common to FCC-ee, -hh, -eh (2)

Offline software developments

Subscribe to [fcc-experiments-software@cern.ch](https://twiki.cern.ch/twiki/bin/view/FCC/FccSoftware)

- ◆ Conveners: Colin Bernet & Benedikt Hegner
- ◆ Weekly meetings and monthly tutorials towards enabling physics analyses

At least for FCC-ee we are at the point of being able to look at events!



Overall twiki page : <https://twiki.cern.ch/twiki/bin/viewauth/FCC/FccSoftware>

FCC-ee : Working groups (2)

□ Phenomenology studies – Coordinators J. Ellis, C. Grojean

- ◆ Match theory predictions to FCC-ee experimental precisions

QCD and $\gamma\gamma$ Physics
(Joint exp/th)
P. Skands

Precision EW calculations
S. Heinemeyer

Flavour Physics
(Joint exp/th)
Jernej Kamenik

- ◆ How to discover new physics in precision measurements, in rare decays (Z, W, t, H, b, c, τ , ...), and in rare or invisible processes

:

Model Building and New Physics
Andreas Weiler

Synergy with
FCC-hh physics
Linear collider physics,
LEP physics
HF physics

- ◆ Set up the framework for global fits and understand the complementarity with other colliders (LHC, FCC-hh, in particular)

Global Analysis, Combination, Complementarity
John Ellis

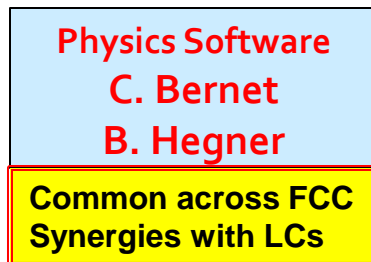
FCC-ee : Working groups (1)

Experimental studies – Coordinators A. Blondel, P. Janot

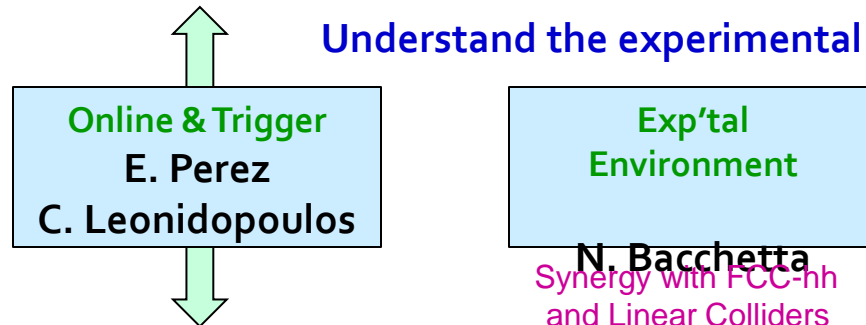
- ◆ Precision measurements of the Z, W, H, t properties - Rare decays – BSM physics



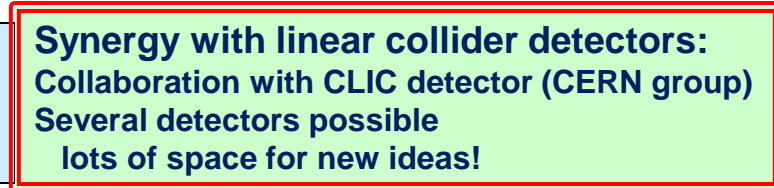
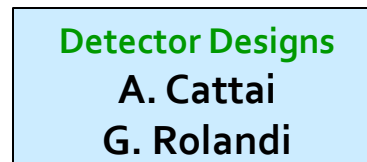
- ◆ Develop the necessary tools



- ◆ Understand the experimental conditions



- ◆ Set constraints on the possible detector designs to match statistical precision





On our horizon:

- we have regular VIDYO conferences on Monday 15:00 -- 17:00 (both acc. and phys.)
- regular meetings of heavy flavour (leptons or quarks) group
- workshop on precision calculations for Future Colliders
13-14 July, CERN
- workshop on interpretation of precision SM tests
in the fall : -- to what new physics are these sensitive
-- extracting info from a series of different measurements
- Workshop on detectors technologies for future e+e- colliders
(should get input from accelerator designs and from phenomenological 'interest')
investigate requirement from precision flavour and searches

Go to FCC-ee web site <http://cern.ch/fcc-ee>
and register to be informed



Fill the complementarity matrix

- **Physics coordination: FCC-ee, -hh, -eh coordinators + project managers**
 - ◆ Ensure that all physics studies progress as one single endeavour
 - Propose physics topics to be used in the study of complementarity and synergies

Subject		ee	hh	eh
Higgs Physics	Precision studies Higher dimension operators Composite Higgs Rare and exotic decays Multiple Higgs production Extra Higgs bosons			
Interface with Cosmology	Dark matter Baryogenesis Dark energy (/almost) sterile neutrinos			
EW Symmetry Breaking	Electroweak scattering Supersymmetry Extra dimensions Composite models			
Flavour Changing	Rare H,Z,W,top decays Lepton flavor violation			
Extensions of the SM	Extra vector-like fermions $SU(2)_R$ models Leptoquarks			
QCD	Perturbation theory, structure functions Modelling final states			
EW precision issues	Precision measurements ($m_Z, m_W, m_t, \alpha_s, \alpha_s(m_Z), \sin^2\theta_W, R_b, \dots$) Higher-order EW corrections W,Z triple and quadruple couplings Top (anomalous) couplings Charm/bottom flavor studies			

Suggest that we form (a) small working group(s) to establish the matrices