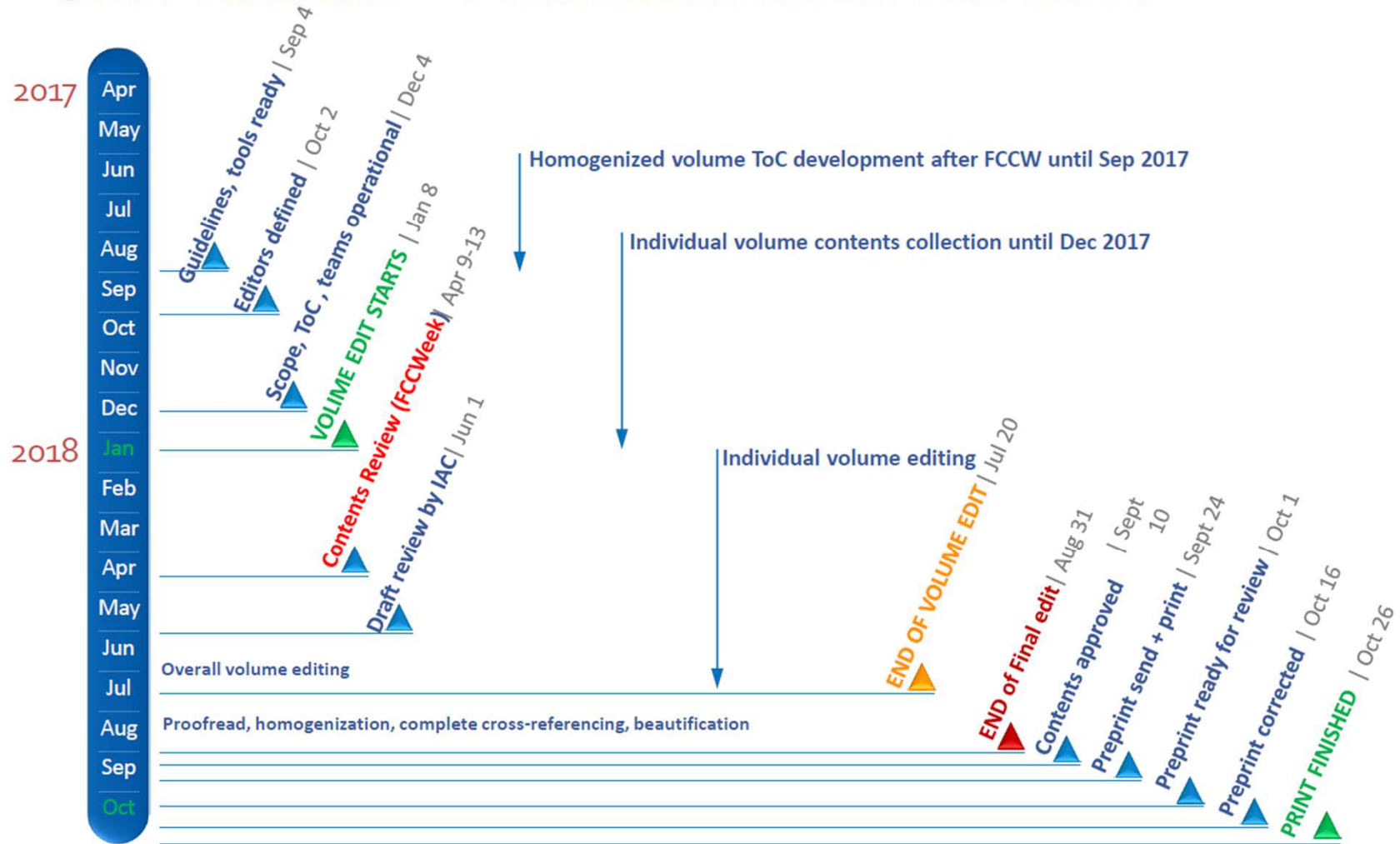




FCC-ee Physics and Experiment review

- 1. CDR plans**
- 2. FCC week in Berlin agenda**
- 3. Review Agenda**

CDR Timeline – Publication 28/29 Nov 2018





FCC-ee physics and experiments



1. outline of FCC CDR book 7 'FCC-ee physics and experiments'

FCC-ee physics and experiments

- ◆ Introduction (history, motivation, running plan ...)
- ◆ Electroweak physics with Z's and W's
- ◆ Higgs physics
- ◆ Top quark physics
- ◆ QCD and $\gamma\gamma$
- ◆ Flavours
- ◆ BSM (Physics behind precision, global fits, direct searches)
- ◆ MDI
- ◆ Polarization and center-of-mass energy measurement
- ◆ Detector designs (with luminosity measurement)
- ◆ Summary and outlook

NB1 Each of the "physics" sections should contain

- The theory counterpart (e.g., the quest for precision calculations)
- The requirements on detectors (geometry, acceptance, resolution, tolerances)
- The requirements on accelerator (luminosity, polarization, Ebeam knowledge)
- The editors for each chapter are the corresponding 2 (3) group conveners



NB2 Concerning the section "Polarization and beam energy measurement", a large part should definitely belong to the book 5 FCC-ee accelerator complex, (all that comprises polarization simulations, corrections etc.. as well as wigglers, polarimeter hardware and etc.)

Only the part concerning i) the choice of transverse polarization vs longitudinal, ii) the energy calibration running mode for the Z pole and W pair threshold as well as the 126 GeV_ECM Higgs point; and iii) the impact of errors on the physics measurements, should be included in Book7

NB3 concerning MDI, the physics book should only treat the experimental side : effect of experimental conditions and the related detector design, for instance luminosity measurement, low angle detector acceptance, impact on vertex detector of beam pipe design. A large part of MDI issues will be in chapter 5.



FCC-ee Physics and Experiments review



Version: 1.6 Date: 07/04/2017

FCC Week 2017 Program

| Time | Sunday | Monday (29.5) | Wednesday (31.5) | Thursday (1.6) | Friday (2.6) | Time | | | | | | | | | | | | |
|-------------|--|--|--|---|---|--|--|---|---|---|---|---|---|--|--|-------------------------------|-------------|-------------|
| 08:30-09:00 | Registration | WELCOME (speakers TBD) | FCC-hh machine design review Design (1) | Conductor Development Program (1) | FCC-ee physics & experiment review Run plan and SM precision measurements | SRF Recent designs and progress | FCC-hh machine design | EuroCirCol WP5 review 16 T Magnet (1) | FCC-hh review Physics potential of FCC-hh | FCC-ee review Optics & instrumentation | Special technologies Beam vacuum | I&O review CE, electricity, ventilation, logistics, transport | FCC-ee Beam dynamics | FCC-hh experiment review Calorimetry & trigger | Summaries Machines and Technologies | Summary FCC-hh machine design | 08:30-09:00 | |
| 09:00-09:30 | | Physics at FCC - M. McCullough | | | | | | | | | | | | | Summary FCC-ee machine design | 09:00-09:30 | | |
| 09:30-10:00 | Opening, study status and physics perspectives | | R. Aleksan (CEA) | A. Ballarino (CERN) | K. Ellis (Uni Durham) | Ben Zvi (BNL) or B. Rimmer (JLAB) | Convener | E. Todesco (CERN) | J. Lykken (FNAL) | J. Seeman (SLAC) | | F. Perez (ALBA) | C. Prasse (FIML) | B. Holzer (CERN) | B. Heineman (DESY) | Summary I&O / Technologies | 09:30-10:00 | |
| 10:00-10:30 | Convener | Study status & further plans - M. Benedikt (CERN) | Coffee Break | | | Coffee Break | | | Coffee Break | | | Coffee Break | | | Convener | Summary Magnets / RF | 10:00-10:30 | |
| 10:30-11:00 | Coffee Break | | FCC-hh machine design review Design (2) | Conductor Development Program (2) | FCC-ee physics & experiment review Higgs, top and flavour | SRF Materials | FCC-hh injector/machine design | EuroCirCol WP5 review 16 T Magnet (1) | Common experiment software | FCC-ee review Machine Detector Interface | Special technologies Other directions for R&D | 16 Tesla magnet US Magnet develop. Programme | FCC-ee Energy calibration & polarization | FCC-hh experiment review Physics performance | Coffee Break | | 10:30-11:00 | |
| 11:00-11:30 | Status Machines | FCC-hh conceptual machine design - CDR plan and status | | | | | | | | | | | | | Summary FCC-hh | 11:00-11:30 | | |
| 11:30-12:00 | | FCC-ee conceptual machine design - CDR plan and status | A. Faus-golfe (CNRS) | C. Senatore (UNIGE) | A. de Roeck (CERN) | J. Palmieri (INFN LNL) | Convener | A. Zobin (FNAL) | Convener | K. Oide (KEK) | | | | | Summary FCC-hh experiments | 11:30-12:00 | | |
| 12:00-12:30 | Convener | HE-LHC CDR plan and status | Lunch | | | Lunch | | | Lunch | | | Lunch | | | Convener | Summary FCC-ee experiments | 12:00-12:30 | |
| 12:30-13:00 | Lunch | | Lunch | | | Lunch | | | Lunch | | | Lunch | | | | Closing remarks | 12:30-13:00 | |
| 13:00-13:30 | Lunch | | Lunch | | | Lunch | | | Lunch | | | Lunch | | | | | 13:00-13:30 | |
| 13:30-14:00 | | | FCC-hh machine design review Beam performance and specifications | Conductor Development Program (3) | FCC-ee physics & experiment review Direct discovery & detectors | SRF review RF system concepts and requirements | Special technologies review FCC-hh beam handling | 16 Tesla Models & Technology ERMC-RMM-Nound Conductor | FCC-hh experiment review Detector requirements & concepts | FCC-ee review Injector | Cost Benefit Assessment Workshop (1) | Special technologies Other Magnets | I&O review Cryogenics | FCC-hh review interation region design | Comon detector technologies | Free lunch break | | 13:30-14:00 |
| 14:00-14:30 | Status Technologies and Infrastructure | Special Technologies R&D - CDR plan and status | | | | | | | | | | | | | | | 14:00-14:30 | |
| 14:30-15:00 | | CE, I&O CDR plan and status | Convener | D. Larbaletrie (Florida State U) | L. Linsen (CERN) | J. Zhai (IHEP) | Convener | S. Gourley (LBL) | J. Incandela (UC Santa Barbara) | E. Levichev (BINP) | Convener | E. Fischer (GS/FAIR) | D. Delikaris (CERN) | O. Brüning (CERN) | Convener | | 14:30-15:00 | |
| 15:00-15:30 | Convener | 16 T Magnet R&D CDR plan and status | Coffee Break | | | Coffee Break | | | Coffee Break | | | Coffee Break | | | | | 15:00-15:30 | |
| 15:30-16:00 | Coffee Break | | FCC-hh machine design review Injectors | Conductor: Electromechanical characterization | FCC-ee physics & experiment review Synergies & complementarities | SRF review Directions for R&D | Special technologies review Recent design & progress | Other Magnets | FCC-hh experiment review Magnet & tracking | FCC-ee review Collective effects & energy calibration | Cost Benefit Assessment Workshop (2) | I&O review Operation, reliability, safety | 16 Tesla magnet review Status towards the CDR | FCC-hh: Physics | HE LHC design | | 15:30-16:00 | |
| 16:00-16:30 | Status Experiments and Detectors | FCC-hh experiments and detector - CDR plan and status | | | | | | | | | | | | | | | 16:00-16:30 | |
| 16:30-17:00 | | FCC-ee experiments and detector - CDR plan and status | Convener | E. Barzi (FNAL) | J. Ellis (Uni London) | S. Belomestnykh (FNAL) | Convener | T. Nakamoto (KEK) | N. Wermes (Uni Bonn) | R. Assmann (DESY) | Convener | L. Miralles (CERN) | M. Benedikt (CERN) | M. D'Onofrio | A. Seryi (IAI) | | 16:30-17:00 | |
| 17:00-17:30 | Convener | FCC-hh CDR plan and status | Refreshments | | | Cold refreshments | | | Cold refreshments | | | Cold refreshments | | | | | 17:00-17:30 | |
| | | | Gender Equality working group | | | FCC / EuroCirCol Collaboration Boards | | | | | | | | | | | 17:30-18:00 | |
| | | | G. Guinot (CERN) | | | Lenny Rivkin / Roy Aleksan | | | | | | Germany specific session | | | XFEL status and activities at DESY | | 18:00-18:30 | |
| | | | | | | | | | | | | Convener | | | Status of the FAIR project | | 18:30-19:00 | |
| | | | | | | | | | | | | | | | IPP Stellarator and Tokamak Research and Technology | | 19:00-19:30 | |
| 19:30-20:00 | | | | | | | | | | | | | | | | | 19:30-20:00 | |
| 20:00-20:30 | | | | | | | | | | | | | | | | | 20:00-20:30 | |
| 20:30-21:00 | | | | | | | | | | | | | | | | | 20:30-21:00 | |
| 21:00-21:30 | | | | | | | | | | | | | | | | | 21:00-21:30 | |
| 21:30-22:30 | | | Welcome reception (LA Café and Wintergarten) | | | | | | | | | | | | Workshop Banquet with Poster Award Ceremony (Pavillon) | | 21:30-22:30 | |

FCC-ee experiments and detector – CDR plan and status
R. Tenchini



| Thursday (1.6) | | | | Friday (2.6) | | Time |
|--|--|---|--|--|-------------------------------|-------------|
| Special technologies <u>Beam vacuum</u> | I&O review <u>CE. electricity, ventilation, logistics, transport</u> | FCC-ee machine design | FCC-hh experiment review <u>Calorimetry & trigger</u> | Summaries Machines and Technologies | Summary FCC-hh machine design | 08:30-09:00 |
| | | | | | Summary FCC-ee machine design | 09:00-09:30 |
| F. Perez (ALBA) | Ch. Prasse/K. Horstmann/G. Follert (?)/FIML | Convener | B. Heineman (DESY) | | Summary I&O / Technologies | 09:30-10:00 |
| Coffee Break | | | | Convener | Summary Magnets / RF | 10:00-10:30 |
| Special technologies <u>Other directions for technology R&D</u> | 16 Tesla magnet <u>US Magnet develop. Programme</u> | FCC-ee EPOL | FCC-hh experiment review <u>Physics potential of FCC-hh</u> | Coffee Break | | 10:30-11:00 |
| | | | | Convener | Convener | Convener |
| Lunch | | | | Convener | Summary FCC-hh experiments | 11:30-12:00 |
| | | | | | Summary FCC-ee experiments | 12:00-12:30 |
| | | | | Convener | Closing remarks | 12:30-13:00 |
| Free lunch break | | | | | | 13:00-13:30 |
| | | | | | | 13:30-14:00 |
| | | | | | | 14:00-14:30 |
| Special technologies <u>Other Magnets</u> | I&O review <u>Cryogenics</u> | FCC-he review <u>interaction region design</u> | <u>Comon detector technologies</u> | | | 14:30-15:00 |
| E. Fischer (GSI/FAIR) | D. Delikaris (CERN) | O. Brüning (CERN) | Convener | | | |

A. Blondel



review of
FCC-ee physics
and experiments

| Tuesday (30.6) | | | | |
|---|--|--|---|-----------|
| FCC-hh machine design review <u>Design I</u> | Conductor Development Program 1 | FCC-ee physics & experiment review <u>Run plan and SM precision measurements</u> | SRF <u>Recent designs and progress</u> | F |
| R. Aleican (CEA) | Convener | K. Ellis | I. Ben Zif (BNL) or B. Rimmer (JLAB) | |
| Coffee Break | | | | |
| FCC-hh machine design review <u>Design II</u> | CDP 2 Other conductors: seminar | FCC-ee physics & experiment review <u>Higgs, top and flavour</u> | SRF <u>Materials</u> | in |
| A. Faiz-galle (CNR3) | Convener | A. de Roeck | V. Palmieri (INFN LNL) | |
| Lunch | | | | |
| FCC-hh machine design review <u>Beam performance and specifications</u> | Conductor: <u>Status of Nb3Sn</u> | FCC-ee physics & experiment review <u>Direct discovery & detectors</u> | SRF review <u>BE system concepts and requirements</u> | rev ht |
| G. Adami (CERN) | Convener | L. Linssen (CERN) | D. Jansing (IHEP) | |
| Coffee Break | | | | |
| FCC-hh machine design review <u>Initiators</u> | Conductor: <u>Electromechanical characterization</u> | FCC-ee physics & experiment review <u>Synergies & complementarities</u> | SRF review <u>Directions for R&D</u> | B |
| Convener | Convener | J. Ellis | S. Belomestnykh (FNAL) | |
| Poster Session | | | Teatime | |
| | | | Gender Equality working group | |
| | | | Geneviève Guinot (CERN) | |



2. FCC-ee Physics and Experiments review at the FCC week in Berlin

(4 sessions of 90 minutes = around 16 talks of 15+5 minutes)

- | | |
|---------------------|---|
| P. Janot | 1. FCC-ee (History, motivation, overview of present status of design study and issues, run plan) |
| P. Azzuri | 2. Electroweak physics at the Z and W – experimental capabilities |
| F. Piccinini | 3. Status and prospects for precision electroweak calculations |
| D. Enterria | 4. QCD and gamma-gamma |
| M. Klute | 5. Higgs physics at FCC-ee |
| P. Azzi | 6. Top physics at FCC-ee |
| S. Monteil | 7. Flavour physics (c, b, LFV) |
| A. Blondel | 8. Beam polarization (longitudinal vs transverse) and energy calibration requirements |
| M. Pierini | 9. Direct searches (SUSY, RH neutrinos, dark matter etc..) |
| M. Dam | 10. Detector design I (FCC-ee requirements and specific designs) |
| L. Leogrande | 11. Detector design II (CLIC adaption) |
| G. Voutsinas | 12. Experimental environment and luminosity measurement (experimental side of MDI) |
| J. Ellis | 13. Synergies and complementarities |
| C. Grojean | 1. Brief introduction on accelerator and infrastructure synergies, Physics behind precision, global fits, invisible widths and BSM physics sensitivity |
| TBD | 2. Higgs physics synergies |
| O. Fischer | 3. QCD synergies |
| | 4. RH neutrinos |
| A. Blondel | 14. Overview and next steps |