GENERAL INFORMATION & STUDY NEWS

Frank Zimmermann

FCC-ee Accelerator & Optics Design Meeting #199 & 70th FCCIS WP2.2 meeting, 12 December 2024

CGM last week – visit of honor by Council president

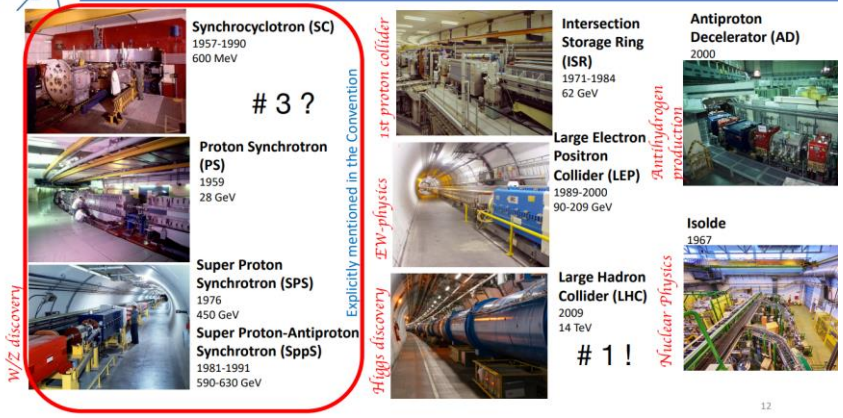
CERN – founded for science for peace

CERN founded in 1954 by 12 European States
Historical background: creation of CERN after the WWII experience

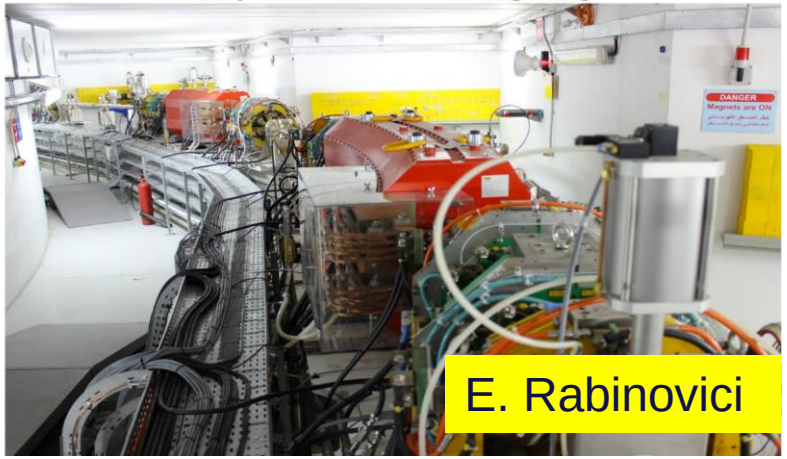
- pool resources among European States to provide for world-class research infrastructures in nuclear/particle physics
- avoid further brain drain from scientists from Europe
- restore peaceful collaboration in Europe

1st provisional Council 1952 Rome 3rd provisional Council 1953 Amsterdam

Landmark Accelerators at CERN



Fully Installed SESAME Storage Ring



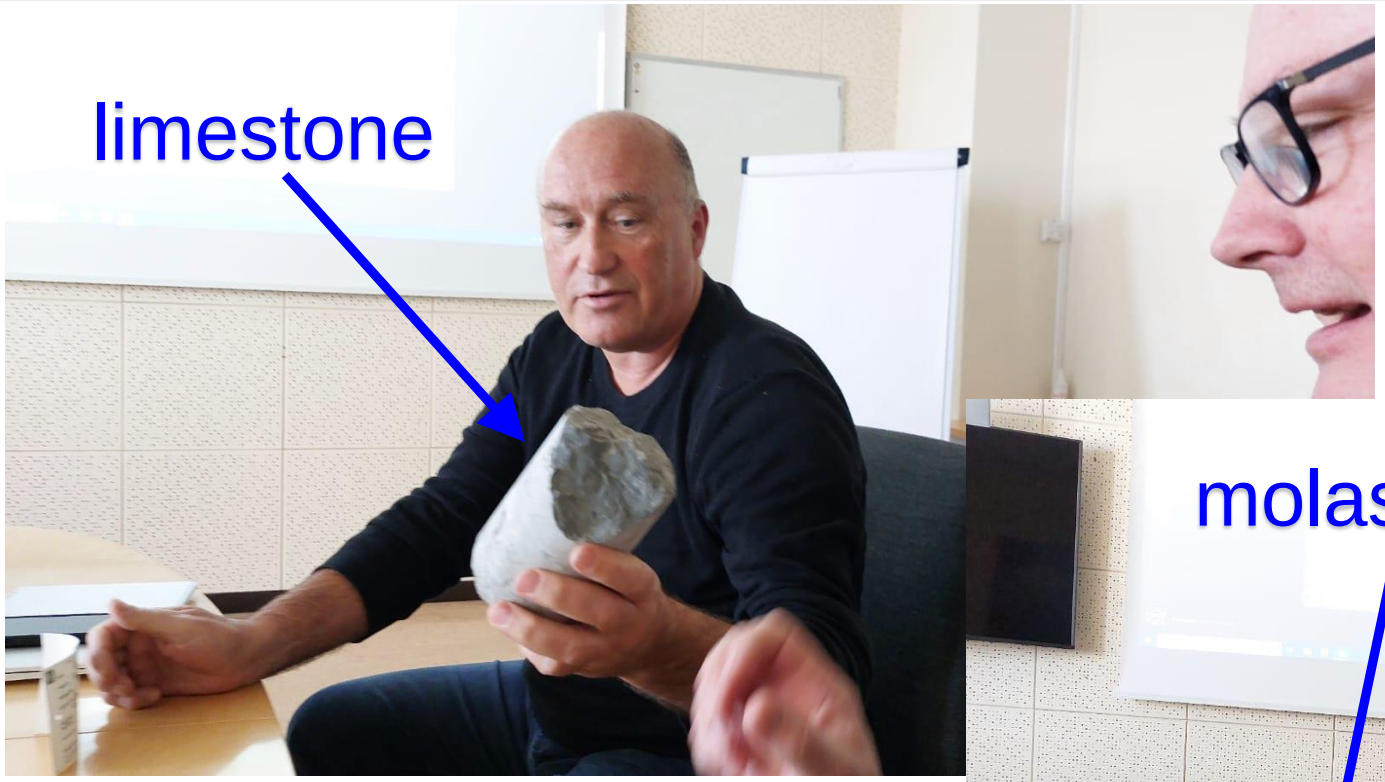
E. Rabinovici

CGM last week – wishes from the Council president

- **THANK YOU PIONEERING PATHFINDERS**
- **MAY YOU SUCCEED FOR ALL OF US**

E. Rabinovici

CGM last week – first drill cores presented



T. Watson

FCC-ee availability study (1)

H. Dostmann,
J. Heron

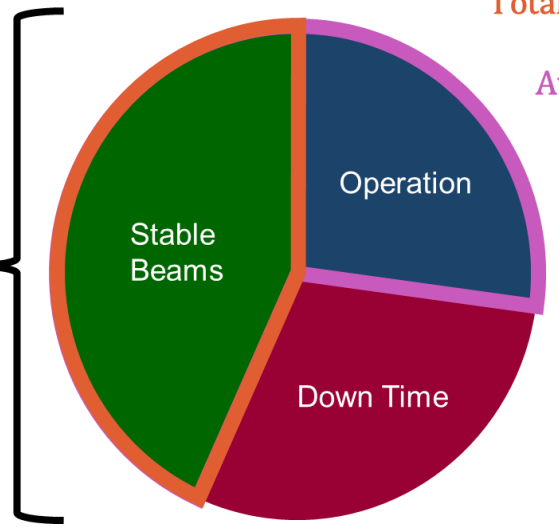
Availability and Luminosity

FCC-ee:

365	days
−120	(extended shutdowns)
− 30	(annual commissioning)
− 20	(machine development)
− 10	(technical stops)
185	**days for physics**

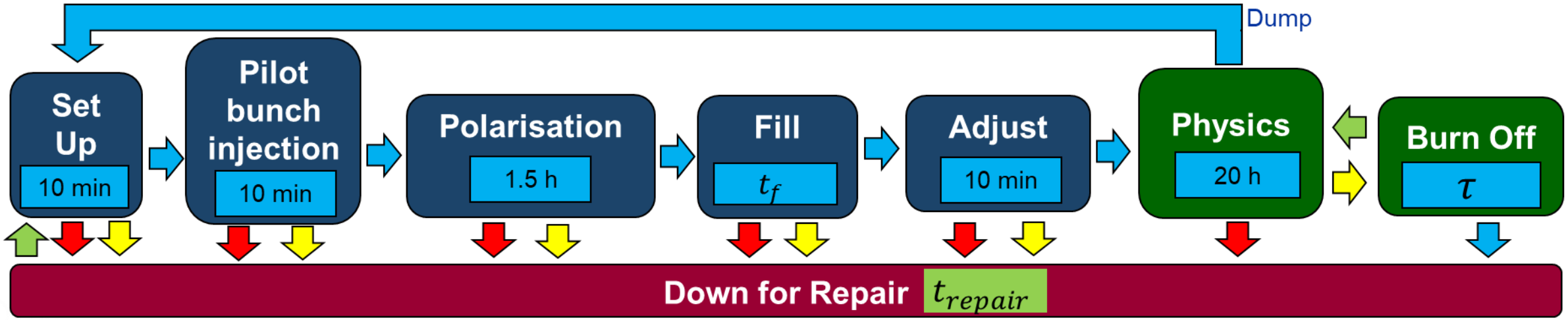
$$\text{Efficiency } E = \frac{\text{Stable Beams time}}{\text{Total physics time}}$$

$$\text{Availability } A = \frac{\text{Up time}}{\text{Total physics time}}$$



FCC-ee Operation Cycle

Z,W



FCC-ee availability study (2)

Do we (need to) abort the beam when we lose a corrector circuit or a sextupole circuit ?

Power Converters

- **Using LHC fault data for two converter types**

FCC - Power Converters						Comparison : FCC - LHC		
		n_FCC [-]	Current [A]	Voltage [V]	Power [W]	LHC Cat. [-]	MTBF of single converter [h]	Group MTBF with FCC n° [d]
Collider	Dipole	16	3,665	175	642,524	LHC4-6-8-13kA-08V	88,133	230
	Quadrupole	32	526	1,748	920,443	LHC4-6-8-13kA-08V	88,133	115
	Sextupole	1,152	178	335	59,722	LHC4-6-8-13kA-08V	88,133	3
	Dipole Tapering	710	7	400	2,820	Corrector	371,639	22
	Quadrupole Tapering	709	10	150	1,547	Corrector	371,639	22
	Horizontal Corrector	2,824	9	45	395	Corrector	371,639	5
	Vertical Corrector	2,824	15	62	943	Corrector	371,639	5
	Skew Quadrupole	2,824	12	47	574	Corrector	371,639	5
Booster	Dipole	16	3,065	840	2,574,600	LHC4-6-8-13kA-08V	88,133	230
	Quadrupole	32	1,540	1,896	2,919,840	LHC4-6-8-13kA-08V	88,133	115
	Sextupole Focusing	32	525	511	268,016	LHC4-6-8-13kA-08V	88,133	115
	Sextupole Defocusing	32	561	819	459,562	LHC4-6-8-13kA-08V	88,133	115
	Dipole Tapering	346	10	352	3,515	Corrector	371,639	45
	Quadrupole Tapering	346	10	352	3,515	Corrector	371,639	45
	Horizontal Corrector	1,672	20	57	1,140	Corrector	371,639	9
	Vertical Corrector	1,672	20	58	1,160	Corrector	371,639	9
	Quadrupole Corrector	1,384	20	59	1,180	Corrector	371,639	11
	Skew Quadrupole	1,384	20	38	760	Corrector	371,639	11
Grand Total		18,007						

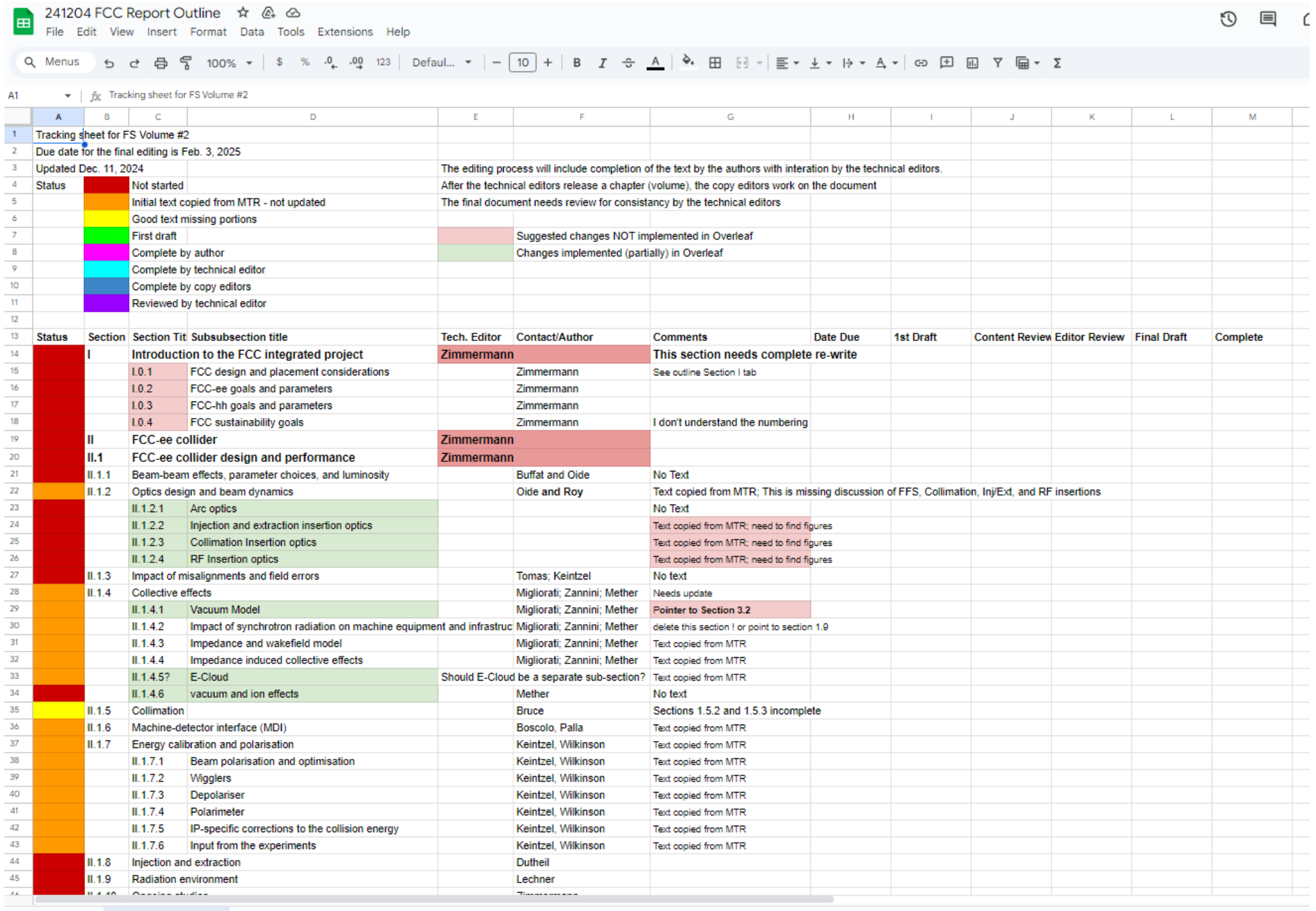
← One failure every 3 days

← One failure every 5 days

H. Dostmann, J. Heron

Tor's spread sheet

https://docs.google.com/spreadsheets/d/1AgeenFi7ckTphNdCv-gfKKTHD5UaK3fOOuf8IVtMN5s/edit?gid=0#gid=0



241204 FCC Report Outline

File Edit View Insert Format Data Tools Extensions Help

A1: Tracking sheet for FS Volume #2

Tracking sheet for FS Volume #2												
Due date for the final editing is Feb. 3, 2025												
Updated Dec. 11, 2024				The editing process will include completion of the text by the authors with interation by the technical editors.								
Status		Not started		After the technical editors release a chapter (volume), the copy editors work on the document								
		Initial text copied from MTR - not updated		The final document needs review for consistancy by the technical editors								
		Good text missing portions										
		First draft				Suggested changes NOT implemented in Overleaf						
		Complete by author				Changes implemented (partially) in Overleaf						
		Complete by technical editor										
		Complete by copy editors										
		Reviewed by technical editor										
Status	Section	Section Tit	Subsubsection title	Tech. Editor	Contact/Author	Comments	Date Due	1st Draft	Content Review	Editor Review	Final Draft	Complete
	I	Introduction to the FCC integrated project		Zimmermann		This section needs complete re-write						
		I.0.1	FCC design and placement considerations		Zimmermann	See outline Section I tab						
		I.0.2	FCC-ee goals and parameters		Zimmermann							
		I.0.3	FCC-hh goals and parameters		Zimmermann							
		I.0.4	FCC sustainability goals		Zimmermann	I don't understand the numbering						
	II	FCC-ee collider		Zimmermann								
	II.1	FCC-ee collider design and performance		Zimmermann								
	II.1.1	Beam-beam effects, parameter choices, and luminosity			Buffat and Oide	No Text						
	II.1.2	Optics design and beam dynamics			Oide and Roy	Text copied from MTR; This is missing discussion of FFS, Collimation, Inj/Ext, and RF insertions						
		II.1.2.1	Arc optics			No Text						
		II.1.2.2	Injection and extraction insertion optics			Text copied from MTR; need to find figures						
		II.1.2.3	Collimation Insertion optics			Text copied from MTR; need to find figures						
		II.1.2.4	RF Insertion optics			Text copied from MTR; need to find figures						
	II.1.3	Impact of misalignments and field errors			Tomas; Keintzel	No text						
	II.1.4	Collective effects			Migliorati; Zannini; Mether	Needs update						
		II.1.4.1	Vacuum Model		Migliorati; Zannini; Mether	Pointer to Section 3.2						
		II.1.4.2	Impact of synchrotron radiation on machine equipment and infrastruc		Migliorati; Zannini; Mether	delete this section ! or point to section 1.9						
		II.1.4.3	Impedance and wakefield model		Migliorati; Zannini; Mether	Text copied from MTR						
		II.1.4.4	Impedance induced collective effects		Migliorati; Zannini; Mether	Text copied from MTR						
		II.1.4.5?	E-Cloud	Should E-Cloud be a separate sub-section?		Text copied from MTR						
		II.1.4.6	vacuum and ion effects		Mether	No text						
	II.1.5	Collimation			Bruce	Sections 1.5.2 and 1.5.3 incomplete						
	II.1.6	Machine-detector interface (MDI)			Boscolo, Palla	Text copied from MTR						
	II.1.7	Energy calibration and polarisation			Keintzel, Wilkinson	Text copied from MTR						
		II.1.7.1	Beam polarisation and optimisation		Keintzel, Wilkinson	Text copied from MTR						
		II.1.7.2	Wigglers		Keintzel, Wilkinson	Text copied from MTR						
		II.1.7.3	Depolariser		Keintzel, Wilkinson	Text copied from MTR						
		II.1.7.4	Polarimeter		Keintzel, Wilkinson	Text copied from MTR						
		II.1.7.5	IP-specific corrections to the collision energy		Keintzel, Wilkinson	Text copied from MTR						
		II.1.7.6	Input from the experiments		Keintzel, Wilkinson	Text copied from MTR						
	II.1.8	Injection and extraction			Dutheil							
	II.1.9	Radiation environment			Lechner							

Tor’s proposed process

A) The editing process will include completion of the text by the authors with interaction by the technical editors;

B) After the technical editors release a chapter (volume), the copy editors work on the document;

C) The final document needs review for consistency by the technical editors.

Master timeline – not negotiable

Notes

Copy-editing should ensure compatibility with style, language and guidelines and deliver coherence across volumes
Submission of Vol.3 is before CERN's Christmas closure, so at least something can be edited before January
The overlap of volumes by one week will be difficult but hopefully possible
Vol.2 is potentially the most problematic and has the shortest time for copy-editing