



HEL Organisation

A. Rossi for the HEL team

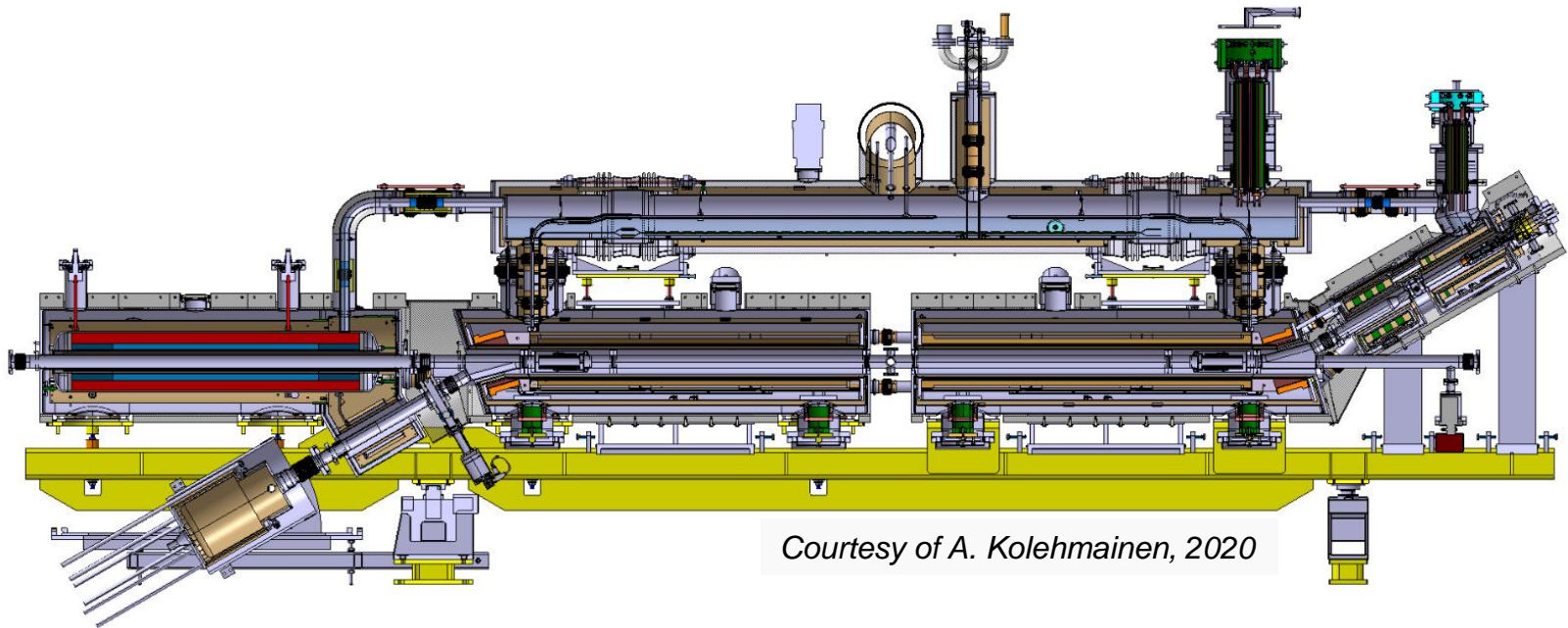
HL-LHC Hollow Electron Lens (production) kick-off meeting – 13 April 2021

Layout

- HEL Deliverables
- Scope (including testing)
- WBS and responsibilities and proposed sub-WP organisation (meetings etc.) and reporting lines to WP5/HL-LHC
- Timeline/planning and main milestones (including external design reviews etc.) – high level

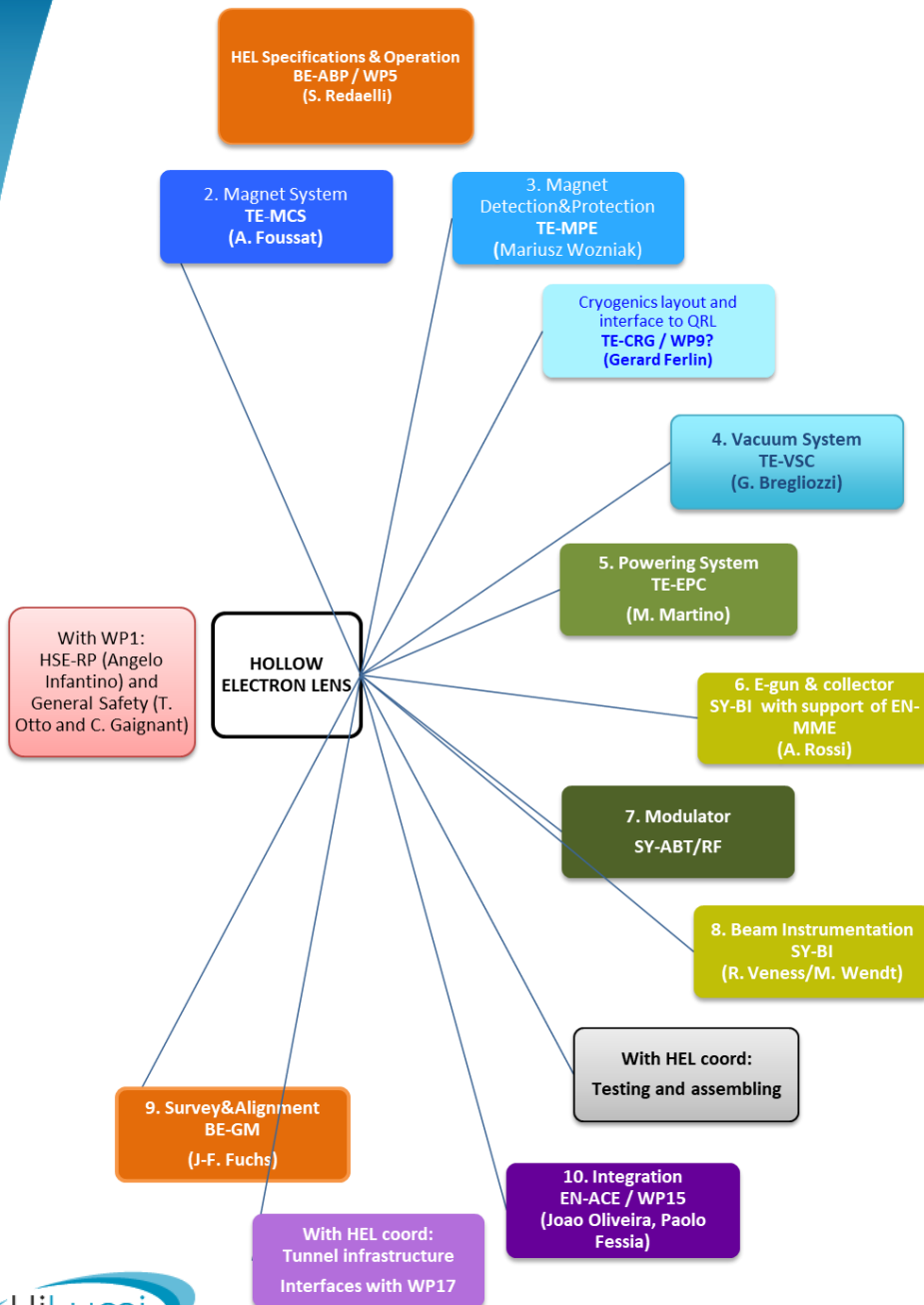
HEL Deliverables

- 3 Hollow Electron Lens units, of which one spare
 - HEL.L4 and HEL.R4 are not entirely symmetric, spare prepared with magnetic system and vacuum (see Diego's and Joao's talk for details)



Courtesy of A. Kolehmainen, 2020

Hollow Electron Lens organisation proposal



- Work subdivided by
 - HEL Subsystems
 - Tests
 - Integration/Installation/Infrastructure
 - Safety
- Budgets with groups
- Integration, testing and installation budget with coordination
- Report to HL/WP5

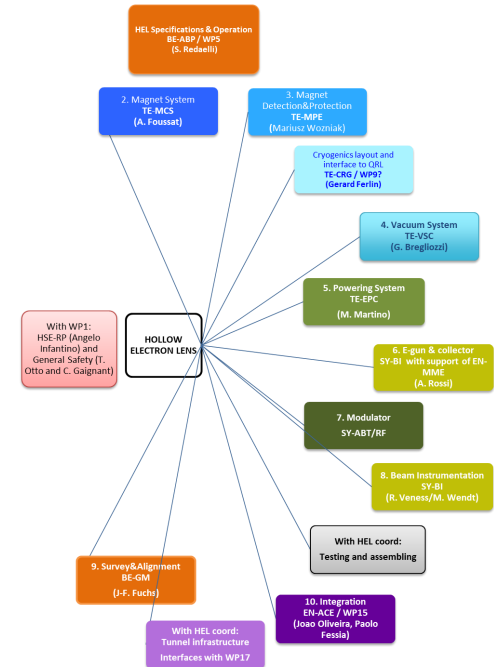
Colour coding with department – group
Responsible names to be confirmed by groups

- WP5.2 Collimation Studies
 - HEL Specifications (S. Redaelli, R. Bruce BE-ABP)

- sWP5.3 Hollow Electron Lens
 - Coordination (A. Rossi SY-BI)

- Magnet System (A. Foussat TE-MCS)
 - Magnetic Design (AF & D. Perini EN-MME)
 - Internal Busbars
 - Ext. Busbars (M. Martino SY-EPC)
 - Girder (AR & DP)
 - Cryogenics (G. Ferlin TE-CRG)
 - Magnet Assembly & Cold Testing (at Cryo-Facility = G. Riddone TE)
 - Metrology (Ahmed Cherif EN-MME)
 - Magnetic Measurements (?)

- 1.a Cold magnet testing (with coordination).
If Cryo-facility (TBC) – G. Riddone (TE)



3. Magnet Detection & Protection (Mariusz Wozniak TE-MPE)
 - ❖ Cryo Layout and QRL interface (G. Ferlin TE-CRG in WP9)
4. Vacuum System (G. Bregliozzi TE-VSC)
5. Powering System (M. Martino SY-EPC)
 - Magnet DC powering
 - HV (gun/modulator-collector) (D. Aguglia)
6. Electron Gun and Collector (AR SY-BI)
7. Gun Modulator (RF/ABT?)
8. Beam Instrumentation (SY-BI)
 - BPM (M. Wendt)
 - BGC (R. Veness)



- 1.b (with coordination) E-Beam Test Stand (S. Sadovich/ J. Cenede) for
 - Electron gun and collector
 - Beam instrumentation
 - Gun modulator
 - HV powering

10. Survey & Alignment (J-F. Fuchs BE-GM)

11. Integration

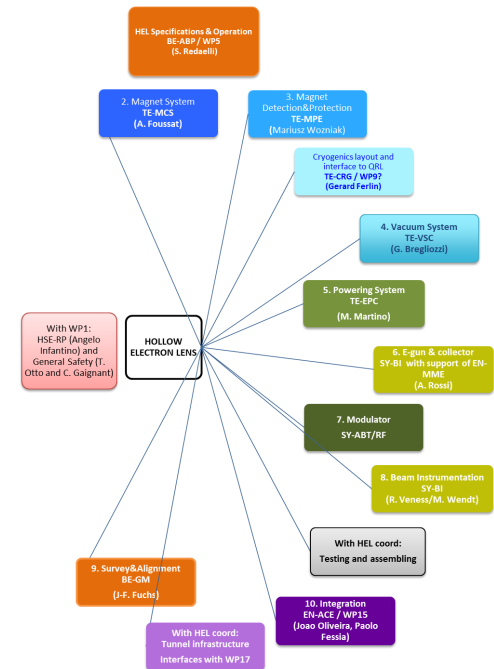
- Transport and installation

✧ Tunnel Infrastructure (interface with WP17)

- Modification of green doors (Jordi Bossy EN-ACE)
- Water Cooling&Ventilation EN-CV (M. Battistin)
- Cabling EN-EL
 - Powering (D. De Luca)
 - Signals (G. Girardot)
 - Fibers (Jeremy Blanc)
 - 220V Sockets (Nuno de Santos)

✧ Safety With WP1

- Radio-Protection (T. Otto)
- General Safety (T. Otto & C. Gagnant)



	Group	In-kind	Acceptance Tests
Magnets systems (solenoid, correctors, cryostats, leads)	TE-MSC	YES, built to spec (BINP)	BINP for procurement, final assembly / testing @CERN Cryo-facility
Quench detection and Energy Extraction system	TE-MPE	NO	
Cryogenics system (connection to QRL)	TE-CRG	NO	
Supports and feet	SY-BI	YES, built to spec (BINP)	
Vacuum systems	TE-VCS	YES built to print (BINP) Pumps and vacuum instrumentation as standard LHC	Validation Y chamber @CERN Pre-assembly leak-test @BINP
Beam instrumentation: BPM, BLM	SY-BI	YES built to print (BINP) Electronics in House	BPM @CERN EBTS* BLM standard LHC
Beam instrumentation: BGC		YES (UK-CI) Electronics in House	BGC @CERN EBTS
Gun and collector		YES built to print (BINP)	Gun & collector @CERN EBTS
Power converters DC and HV	TE-EPC	NO	HV powering @CERN EBTS
Anode Electron beam Modulators	SY-ABT or RF	In study	Modulator @CERN EBTS
Cabling, integration, transport, cooling, alignment		NO	
Powering Interlock controllers		NO	HV powering @CERN EBTS

* EBTS = Electron Beam Test Stand

Timeline from now

- Consolidate resources (budget and manpower) by end of May '21 and sub-WP structure
- Complete functional specs for all systems and ECR for installation by Nov. '21
- Validate list of milestones and deliverable per task
- Monthly/bimonthly meetings for all contributors

- **Engineering reviews by subsystems (proposal), including testing**
 - Dec. '21 Magnet System – CERN functional design
 - Mar. '22 Gun – CERN engineering design
 - Jun. '22 Modulator – CERN design
 - Nov. '22 Collector – CERN engineering design
 - Dec. '22 BLM, BGC and BPM – CERN design/
 - Mar. '23 HV powering system
- **First half '23 integration review to finalise TDR**
 - May. '23 Magnet System – BINP engineering design

- **HEL Full Engineering Documentation date . . .**
- **Production review with BINP and UK collaborators . . .**

Scope of the kick-off meeting

- Validate the HEL functional specifications:
 - Subsystem to specs
- Delineate a HEL reference design (as a starting point to organise the work),
- Describe the work break-down structure and responsibilities,
- Give a first estimate on budget/resources,
- Define what has to be done at CERN (and with what additional resources from in-kinds) and what can be outsourced including validation measurements, assembly and testing.
- Highlight open points