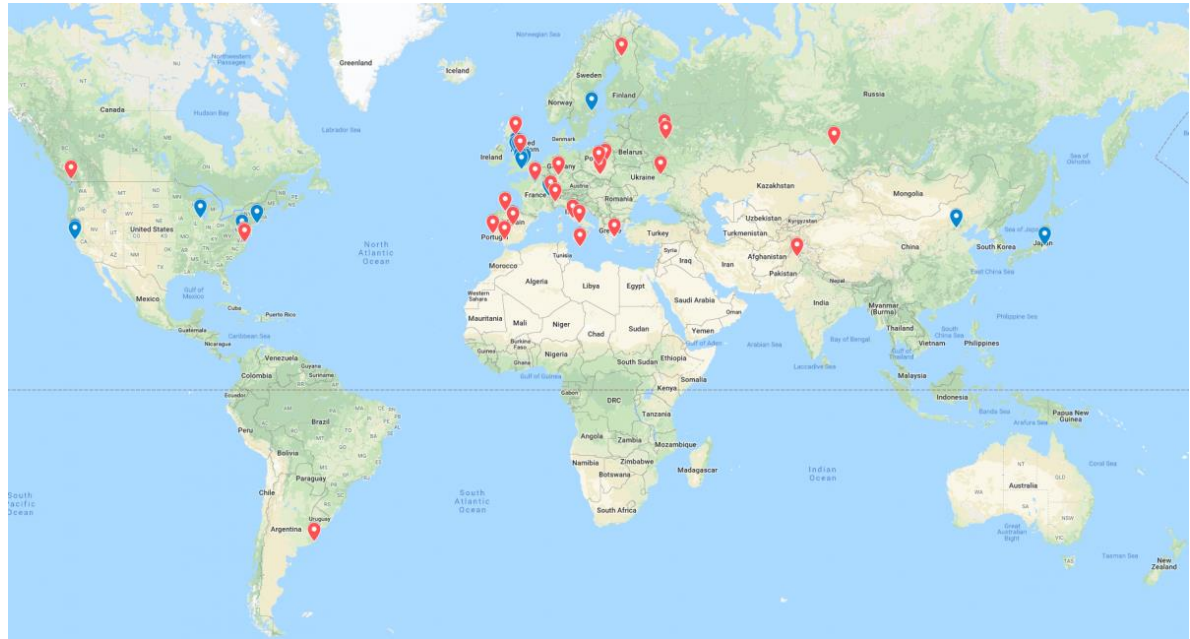


Collaborations Overview

- We are in a new phase
 - Most of the Collaboration Agreements have been signed
 - Some are not yet signed OR funded: discussed later
- The constructions and productions are started or starting
- The Collaboration office will be mainly in support for monitoring, e.g. having the overview for multiple agreements in single countries, assist in financial matters in liaison with the Budget office

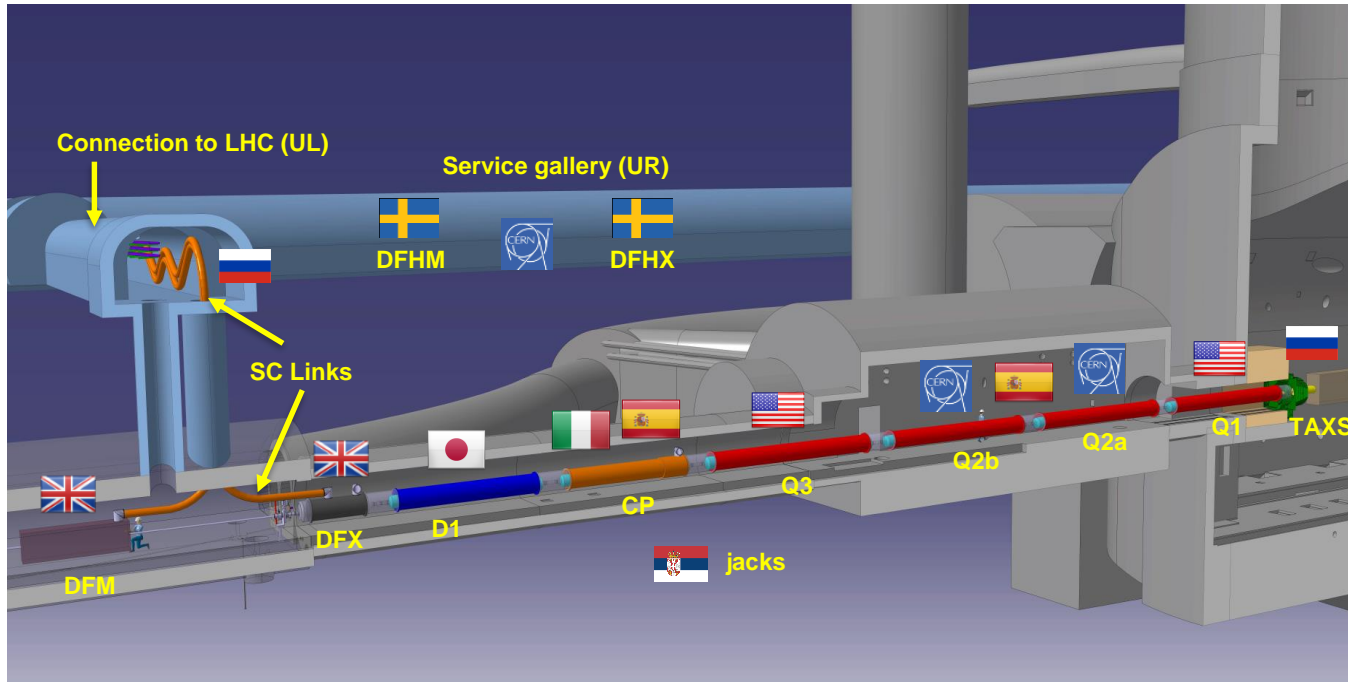
Country	Institution	Signed	
Canada	TRIUMF	MoU	
China	IHEP Beijing	MoU, Add	
	BJUT	MoU	
	ASIPP	MoU	
Finland	LAPIN	CA,MoU	
France	CNRS	MoU	
	CEA	CA	
Greece	NTUA	MoU	
	IASA	MoU	
Italy	INFN	CA, MoU	
Japan	KEK	MoU, Add	
JINR	JINR Dubna	CA, MoU, Add	
Malta	University of Malta	CA, MoU	
	AGH-UST	CA	
Poland	NCBJ	CA, MoU	
	IFJ-PAN	CA,MoU	
	BINP	CA, MoU	
Russia	IHEP Protvino	CA	
	PNPI	CA	
	MEPhI	MoU, Add	
Spain	CIEMAT	CA,MoU, Add	
Sweden	University of Uppsala	CA, MoU, Add	
Switzerland	EPFL	CA, MoU	
	University of Geneva	CA, Add	
UK	University of Manchester	CA, MoU	
	University of Lancaster	CA, MoU	
	Royal Holloway University	CA, MoU	
	University of Liverpool	CA, MoU	
	STFC	CA	
	University of Southampton	CA, MoU	
	University of Dundee	CA, MoU	
	University of Huddersfield	CA, MoU	
University of Oxford	MoU		
Ukraine	Kharkov Institute of Physics	MoU, Add	
	SLAC	CA	
USA	FNAL	CA	
	LBNL	CA	
	BNL	CA	
	JLAB	CA	
	ODU	CA	

Collaborating Institutes

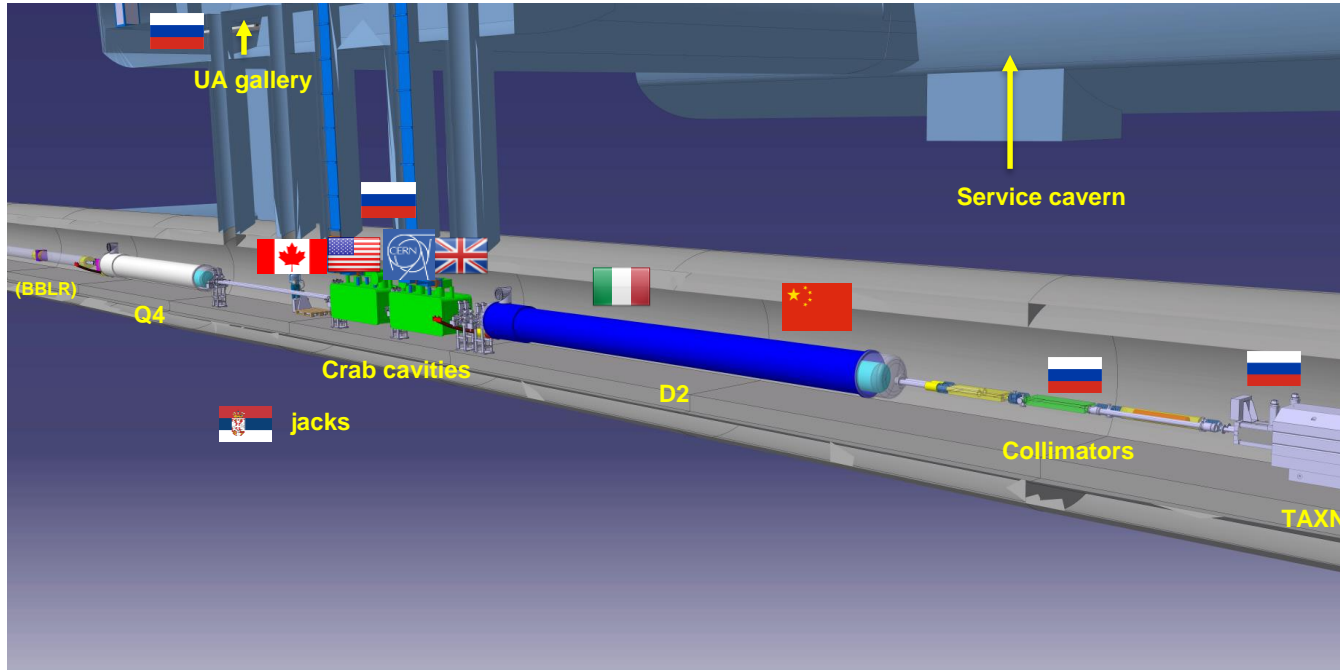


Colour codes to be updated
MoU: stable, signs of evolutions

The Inner Triplet region: collaborations



The MS (matching section) region: collaborations



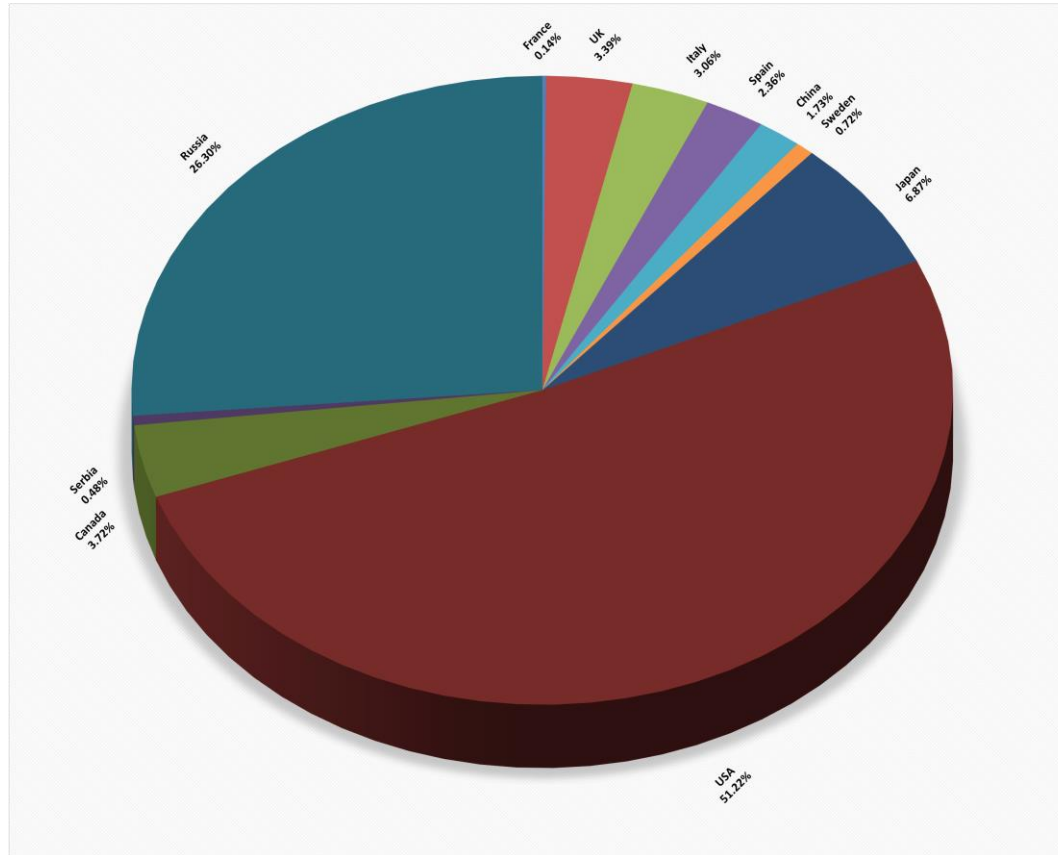
Summary tables

- Here summarized the in-kind contributions to the Project from R&D latest phase to Production
- After the 2019 Cost & Schedule review most options became baseline:
 - HEL and beam instrumentation, Crystals, Dump
 - SSPM became baseline for RF powering
 - BLMs with 50% contribution from HL-LHC
 - HL-LHC contribution to LESS to complete the development
- Still a couple of options
 - Long Range Beam-Beam wire compensators
 - Class 0 power converters for sectors with high-beta functions

Prototypes & Baseline production: TOTAL in-kind ~ 130 MCHF (CORE COST)

	COUNTRY	Institute	Brief description of the collaboration
R&D	France	CEA	Thermal Design of Superconducting High Field Magnets at CERN
	UK	Manchester	Beam instrumentation
	UK	Manchester	Cold powering: DFBX for String
	UK	ASTeC+Dundee	Laser treatment prototype (LESS)
Prototypes and BASELINE	Italy	INFN	High-order corrector magnets + prototypes
	Spain	CIEMAT	Nested orbit correctors + prototypes
	China	IHEP	D2 Correctors
	Sweden	Uppsala Univ.	Cold testing of corrector magnets and crab cavities
	Japan	KEK	D1 magnet model and cold mass
	Italy	INFN	D2 model + prototype+ Magnet
	USA	Several	Crab Cavities
	USA	Several	Triplet magnets
	Canada	TRIUMF	RFD Crab-cavities cryomodules
	Sweden	Uppsala Univ.	DFHM and DFHX 8+2 units
	UK	SOTO	DFM and DFX 8+2 units
	UK	ASTeC+Lancaster	DQW Crab-cavities cryomodules
	Serbia	Ministry	Magnets and CC jacks
	Russia	BINP	TAXS and TAXN
	Russia	BINP	Current leads matching section and inner triplets
	Russia	BINP	Low impedance collimators (12 units) + IR collimators (28 units)
	Russia	BINP	Solid State RF powering (replacing IOT)
	Russia	BINP	BPM Mechnics (20+28 units)
	Russia	Protvino	Ionisation chambers for SPS and LHC systems for HL-LHC beams (1000 units)
	Russia	MEPhI + JINR	HF-HOM and HOM Couplers and Filed Antennas
	UK	LIV+RHUL	Beam instrumentation EO-BPM
	Russia	BINP	LHC Kickers and Dump
	Russia	BINP	Hollow e-lens
	Russia	PNPI/Protvino	Crystal collimation for ions
UK	Liverpool	Beam Instr. For Hollow e-lens	
UK	Dundee	Laser treatment final (LESS)	

Graphical summary



Very condensed status for Collaborations

- All are affected by COVID in different ways, analysis of impact ongoing
- **Canada:** beam physics studies going well, cryomodules construction passed reviews for scope and budget, interest for a collaboration on long range beam-beam wire compensators; **dependencies: validation of UK1 prototype and deliveries of CC by USA**
- **China:** 1st full length prototype of MCBRD correctors reached ultimate current with long training; improvements expected on practice coil with new procedures; **dependencies: correctors need for integration with D2 from Italy for final test**
- **Italy:** D2 prototyping work being completed, series production approved and to be started - HO correctors construction ongoing – other agreements, including Crystals, ongoing; **dependencies: D2 correctors from China; critical: we have no margin left in the schedule today for integration of D2 magnets and correctors**
- **Japan:** D1 practice coil unveiled a need for a redesign, D1 prototype for IT-string delays minimized, expect to complete delivery of the series by 2024; **dependencies: final cryo-magnet assembly at CERN; critical: delivery of prototype for IT-string – today no margin for delivery of series for final assembly at CERN**

Very condensed status for Collaborations

- **Russia**: ongoing agreements with some impact from COVID; **Main contribution: funding starting in 2021, analysis ongoing**
- **Serbia**: agreement for jacks not yet finalized, more news in a couple of weeks. COVID and change of government delayed the process, but also gave to CERN the possibility of converging to more defined technical specifications; **dependencies: possibility of deployment of pre-production in IT-string; critical: pre-production for IT-string; mitigation: we can use spare LHC jacks for IT-string**
- **Spain**: MCBXF- magnets construction – two prototypes showing different training behaviors now being studied – priority given the first series magnet built at CIEMAT wrt long prototype – preparing for production – COVID impact significant; **dependencies: integration in Q2 quadrupoles and in corrector package; critical: no margin left in the schedule today for these integrations at CERN**
- **Sweden**: commissioning the setup for CC tests and soon for correctors tests – stipulating agreement for the production of nine DFH- boxes (first one will be built at CERN with possibly components from Sweden); **dependencies: integration of correctors**

Very condensed status for Collaborations

- **UK:** Impact of COVID on UK1 deliverables assessed with extension of the agreements to March 2022, mainly driven by cryomodules and cold powering – UK2 acceptance criteria compilation almost completed, now focus to finalization of agreements; **dependencies: use of the RFD cryomodules for SPS test; critical: SPS test results for USA and Canada contributions – DFX pre-series for IT-string**
- **USA:** imminent CD-3 review – good performance of two MQXF- - COVID affected the activities and the contingency; **dependencies: CERN delivery to USA of Cryoassembly tooling and cryostat kits; critical: Q1/Q3 on critical path for the project – delivery of 2 first cryo-magnets for the IT-string assembly**

Status of pending agreements

- All 10 Russian agreements have been signed by the lab directors. The Russian Federation government will provide funds starting from 2021
 - We are analysing the impact of this delay together with COVID-induced delays and LS3 move
- The amendments of UK1 are being finalised
- The drafts of UK2 are being refreshed for the schedule
- The Sweden agreement for DFH boxes is in final form waiting for conclusion of contracts by the University with industry; the corrector tests agreement needs an amendment for duration

Status of pending agreements

- USA MoU to be signed after CD-3 review. In final form being exchanged between legal services. We know that there will be a request to adjust the baseline backup plan
- TRIUMF agreement is being prepared for signatures as we speak
- Serbia agreement for the jacks being drafted (for magnets, CC, TAXN, HEL)
- Amendments for duration and cost (INFN HO correctors)
- Several small agreements for manpower or specialised measurements are in progress

Collaboration office activity

- Organising more the collaboration office to have a uniform organisation of meetings (Steering Committees) and a more systematic monitoring of the activities in support to the work-packages
- Centralised management of the minutes and of the documents (agreements, exchange of letters) – C. Noels
- New agreements as needed for additional work
- Finalisation of the pending agreements

Collaboration office ongoing activity

- The processing of data (deliverables, schedule, costs) to provide forecast and monitoring for collaborations with evolving evaluations based on bottom-up input (from WPs) – E. Lamb
 - The technical aspects of what listed as status before is with WPs, while the collaboration office monitors the global impact
- The support to WPs continues for invoicing matters and providing a global overview for complex agreements, including inter-dependencies of the various collaboration agreements (e.g. D2 correctors and D2 magnets, Crab-Cavities and cryomodules in TRIUMF and UK, etc.) in collaboration with technical WP leaders

Conclusions

- The HL-LHC project is a sound truly international collaboration
- The production/construction era is started
 - Status of the various collaborations will be visible in the talks this week with details about what briefly sketched
- Dealing with baseline, no options anymore
- Few important collaboration agreements being finalised
- A reinforced collaboration office to provide support across WPs