FCC Special Technologies Work Package

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FCC Special Technologies

Mandate

- Study the special technologies at conceptual aspects required for the FCC accelerator and identify the possible design and performance limitations for the accelerator.
- Identify challenges, opportunities for technological breakthroughs and set the R&D program.
  - Understand impacts of technologies
  - Prioritize R&D topics
  - Define scope, schedule, cost guidelines
  - Reporting on Specific Technologies R&D Programs
- Set up Collaborations to address standard FCC issues and R&D opportunities
- The R&D activities will then be followed in the frame of the Accelerator R&D Work Package which is sub-divided in three Sub-Work Packages:
  - High field Magnet Program
  - Superconducting RF Program
  - Special Technology Program (all except Magnets and RF)

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Items included in Work Package (1/2)

Washington'15

- 1 EuroCirCol WP4 proposal
  - 1.1 Cryogenic beam vacuum system conception
- 2 Cryogenics challenges
  - 2.1 Magnetic refrigeration for SC RF cavities
  - 2.2 Proximity Cryogenics for FCC-hh
- 3 Beam Transfer challenges
  - 3.1 Kicker generator with solid state switch technology
  - 3.2 Kicker magnet R&D
  - 3.3 Septum magnet R&D
  - 3.4 Fast electronics, triggering and switch controls
- 4 Manufacturing technologies
  - ~~4.1 High velocity forming of superconducting RF structures~~
  - ~~4.2 Additive manufacturing for RF structures~~
  - ~~4.3 Novel materials for the high-energy frontier~~
- 5 Normal Conducting magnets
  - 5.1 Radiation hard easily pluggable normal conducting coils and ancillaries
  - 5.2 Compact magnets & air cooled windings
- 6 Transverse Feedback systems
  - 6.1 Transverse Feedback (TFB)

FCC Special Technologies

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Roma'16

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  - 1.1 Cryogenic beam vacuum system conception
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  - 3.2 Kicker magnet R&D
  - 3.3 Septum magnet R&D
  - 3.4 Fast electronics, triggering and switch controls
- 4 Manufacturing technologies
  - 4.1 Additive manufacturing for accelerator components
  - 4.2 Additive manufacturing for vacuum systems
- 5 Normal Conducting magnets
  - 5.1 Radiation hard easily pluggable normal conducting coils and ancillaries
  - 5.2 Compact magnets & air cooled windings
- 6 Transverse Feedback systems
  - 6.1 Transverse Feedback (TFB)

FCC Special Technologies

Items included in Work Package (2/2)

Washington'15

- 7 Collimators & Dumps energy simulations
  - ~~7.1 Energy Simulation Challenges: Best Materials for Collimators and Dumps?~~
  - ~~7.2 Beam induced damage and hydrodynamic tunnelling~~
  - ~~7.3 Remote handling and impact on Accelerator design & Infrastructures~~
- 8 Beam Instrumentation
  - 8.1 Beam loss monitors (BLM) for FCC-hh
  - 8.2 Beam size measurement for FCC-hh
  - 8.3 Beam instrumentation (others)
- 9 Beam Vacuum
  - 9.1 FCC hh Vacuum challenges
  - 9.2 FCC ee Vacuum challenges
  - ~~9.3 HTS Coating techniques for impedance mitigation~~
- 10 Insulation Vacuum
  - 10.1 Helium leaks mitigation
- 11 Radiation Hardness of Electronics
  - 11.1 Radiation Hardness Assurance (RHA)
- 12 Magnets & Machine protection
  - ~~12.1 Architecture of powering and protection systems for high field circuits~~
  - 12.2 Concept & Architecture of the machine protection and interlock systems
  - 12.3 HTS magnet protection

FCC Special Technologies

Items included in Work Package (2/2)

Roma'16

- 7 Collimators & Dumps energy simulations
  - 7.1 Studies on beam intercepting devices for FCC
  - 7.2 Remote handling and impact on Accelerator design & Infrastructures
- 8 Beam Instrumentation
  - 8.1 Beam loss monitors (BLM) for FCC-hh
  - 8.2 Beam size measurement for FCC-hh
  - 8.3 Beam instrumentation (others)
- 9 Beam Vacuum
  - 9.1 FCC hh Vacuum challenges
  - 9.2 FCC ee Vacuum challenges
  - 9.3 TL-based superconducting coatings for the FCC-hh
- 10 Insulation Vacuum
  - 10.1 Helium leaks mitigation
- 11 Radiation Hardness of Electronics
  - 11.1 Radiation Hardness Assurance (RHA)
- 12 Magnets & Machine protection
  - 12.1 Powering, protection architecture for high field circuits
  - 12.2 Concept & Architecture of the machine protection and interlock systems
  - 12.3 HTS magnet protection

Special Technologies (- of interest for:)

Program of Sessions: Wednesday 08:30-10:00 (Location: Costantino)

FCC-hh Beam dump concept

Conveners: ALEKSAN, Roy

- 08:30 [189] History and lessons from existing and studied high energy hadron machines (SSC, VLHC, Tevatron, LHC)
  - SYPHERS, Michael
- 08:50 [89] Dump system concepts, dilution and comparison of options
  - BARTMANN, Wolfgang
- 09:10 [94] Surviving an asynchronous beam dump
  - GODDARD, Brennan
- 09:25 [91] Absorbers for beam dumping
  - LECHNER, Anton

Special Technologies

Program of Sessions: Wednesday 13:30-15:00 (Location: Costantino)

Technologies R&D: Beam transfer, Magnet & Instrumentation

Conveners: TORAL, Fernando

- 13:30 [82] FCC-hh injection and extraction kicker topologies and solid state generators
  - KRAMER, Thomas
- 13:50 [30] Septum concepts, technologies and prototyping for FCC-hh injection and extraction
  - BARNA, Dani
- 14:10 [191] FCC-ee warm magnets design
  - MILANESE, Attilio
- 14:30 [188] Perspectives for beam-beam- compensation and collimation using electron beams for FCC-hh
  - SCHMICKLER, Hermann

Special Technologies

Program of Sessions: Wednesday 15:30-17:00 (Location: Costantino)

Technologies R&D: Beam Energy Deposition & Machine Protection

Conveners: BRUNNER, Olivier

- 15:30 [24] Simulations of Hydrodynamic Tunneling of FCC Proton Beam in Solid Cu target and its Implications on Machine Protection
  - TAHIR, Naeem
- 15:50 [196] FCC beam dump septum requirements and suitability of different septa technologies and topologies
  - ATANASOV, Miroslav Georgiev
- 16:10 [217] Concepts for magnet circuit powering and protection
  - PRIOLI, Marco

Special Technologies

Program of Sessions: Thursday 08:30-10:00 (Location: Costantino)

Technologies R&D: Beam vacuum & cryogenics

Conveners: CHIGGIATO, Paolo

- 08:30 [157] Magnetic refrigeration down to 1.6 K for FCC-ee
  - TKACZUK, Jakub
- 08:50 [219] FCC-hh Beam screen studies and beam screen cooling scenarios
  - GARION, Cedric
- 09:10 [220] FCC-ee Vacuum Effects and Simulations
  - KERSEVAN, Roberto
- 09:30 [35] Simulation of the Evolution of the Residual Gas Particle Density – an Analytical Approach
  - AICHINGER, Ida
- 09:45 [222] Concept of in situ repair using laser based additive manufacturing techniques
  - TORIMS, Toms

Special Technologies

Program of Sessions: Thursday 10:30-12:00 (Location: Traiano)

Technologies R&D: Beam Induced Effects

Conveners: MALYSHEV, Oleg

- 10:30 [223] The LHC RF transverse system and perspectives for FCC-hh
  - HOFLE, Wolfgang
- 10:50 [224] FCC-hh Beam impedance mitigation at injection: Status report on HTS coating study
  - CALATRONI, Sergio
- 11:10 [225] FCC-hh Synchrotron Radiation Effects: The new ANKA facility for desorption measurement
  - CASALBUONI, Sara
- 11:30 [102] Radiation Hardness of Electronics in the FCC
  - GARCIA ALIA, Ruben

Closing remarks

- Progress made towards identification of critical items…
  - Iterative process.
- Scope, deliverables and milestones are compiled…
  - and adjusted periodically.
- CERN Resource impact evaluated…
  - and commitments have been confirmed.
- Scenario "a la carte", come and talk with us…
  - for once, Technologies allow *conceptual dreams*.
- For CERN…
  - Prioritisation has been made…
  - and allocations of resources are progressing as expected.
- Same dynamic observed with Partners…
  - Join the dense set of talks.

Setting Collaborations…

- Range of technologies to be covered is wide

and

- We need to be on time within **2** years with the CDR…

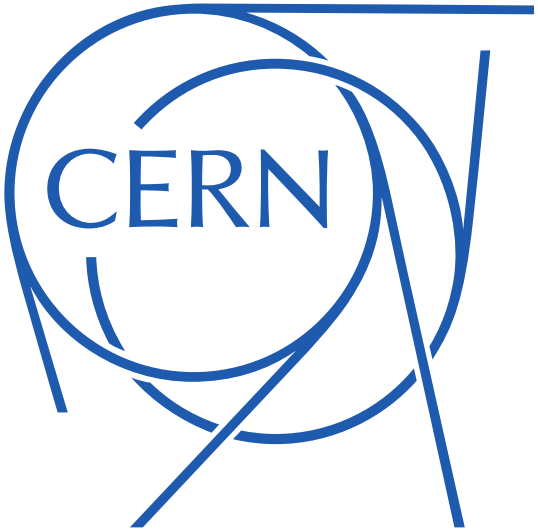
Take the opportunity to engage on

Conceptual Technologies

Dream the next generation of Accelerator Components

Takes-off with us!

Dr. José Miguel JIMENEZ (Coordinator)
CERN, Technology Department
Dr. Olivier BRUNNER (Deputy Coordinator)
CERN, Beams Department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