FTEC 2018 Call

1. Short description of the FTEC 2018 Program

The FTEC Trainee Programme (Formacion en Tecnologias Estrategicas del CERN) is a collaboration between CERN and CIEMAT (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas) in Spain.

This programme is aimed at recent graduates from university or higher technical institutes seeking further training in a wide area of technological projects related to accelerator science and related infrastructures. The programme facilitates a training period of 1-2 year at CERN.

The qualifications you need

In order to qualify for the programme the main requisites following applies:

- You hold a Master degree ("ingeniero superior" or "master") or are about to obtain it (you are expected to have your Masters when starting your contract) in the field of mechanical, electrical, electronic or computing engineering, applied physics or equivalent.
- You have no more than 4 years' experience following completion of your last degree.
- You have not previously worked at CERN for more than 14 months.

(Exceptions to the application of these criteria can be envisaged if you hold a PhD degree or are in the process of obtaining it.)

Please see the official regulation basis of the FTEC Program for further and full complete information.

If you are selected, you will join a team working at CERN and have the opportunity to broaden your knowledge through participation in the hi-tech activities of the laboratory.

You could be working in fields as wide-ranging as: superconducting and resistive magnets; power converters and their associated electronics; cryogenics and vacuum technologies and electronics for detectors; including radiation resistance issues; and other activities related to infrastructures which could potentially have returns in industry.

The application process.

You can apply once per year for an FTEC position. All available projects will be published once the job is open and maximum 20 projects will be available.

Please make sure you have all the documents requested to hand as you start your application (CV, most recent relevant qualification/diploma, academic transcript of your highest qualification, reference letters).

Please note that you must also complete a questionnaire and provide the relevant documents listed in the questionnaire (those are additional documents to those mentioned above) to justify your answers.

The selection process will be conducted by a dedicated panel of experts from CERN and CIEMAT. If successful, you will normally be expected to take up your appointment in February/March 2019.

2. List of FTEC 2018 Positions

- Thermal / Instrumentation Engineer for Superconducting RF cavities.
- Electronics Engineer or Applied Physicist for next Generation Optical Links for CMS Calorimeter Upgrade
- Electronics Engineer for Development of Radiation Tolerant Mixed Signal Design Kits
- Electronics Engineer or Experimental Physicist working on the Definition, Selection and Implementation of Instrumentation for Superconducting Cables and Current Leads
- Electronics Engineer in Radiofrequency Measurement
- Software Engineer for the Design and Implementation of Software for Beam Position Monitors
- Electro-Mechanical Engineer working on Large Superconducting Magnets
- Mechanical Engineer working on the Dimensional Control of Nb3Sn Coils and Magnet Assemblies
- Safety/Environmental Engineer or Mechanical/Civil/Electrical Engineer
- Test engineer for superconducting magnets and superconducting links
- Electro-mechanical Engineer for Nb3Sn and HTS Coil Production, Magnet Assembly and Qualification Measurements during Production
- Electronics Engineer working on Pulse Generators for the LHC Beam Dump Systems
- Development of Industrial Control Systems for Cooling and Ventilation Plants
- Computer Engineer in CERN's Analogue Signal Acquisition System
- Industrial Control Engineer for the follow-up of the BIDs monitoring tools
- Mechanical Engineer for the Design and the Construction of Cryogenic Devices and Systems
- Software Developer in the CAD and PLM domain
- Mechanical Engineer for the design and construction of high power Radio Frequency (RF) devices
- Electronics Engineer for Modeling and Design of Data Readout for CMS Calorimeter Upgrade
- Electronic/Electrical Engineer working on the Development of Quench Protection Systems for Superconducting Magnet Circuits

(All the positions are full-time and positioned at Geneva, Switzerland)

3. Description of the FTEC 2018 Positions

1. Thermal / Instrumentation Engineer for Superconducting RF cavities

- Geneva, Switzerland
- Full-time

Job Description

Welcome to the Spanish Trainee Programme FTEC (Formacion en Tecnologias Estrategicas del CERN)!
CERN and our professionals very much enjoy sharing their knowledge and expertise with recent graduates from university or higher technical institutes seeking further training in a wide area of projects and who are committed and passionate about their chosen field.
The BE-RF-SRF section is in charge of superconducting radio-frequency devices and developments for existing accelerators and new projects. As such, it works in close collaboration with the Cryolab (Central Cryogenic Laboratory) of the TE-CRG-CI section, for development related to material characterization and thermal mapping of superconducting cavities.
Functions
Highly sensitive thermometry has been developed for quench localization in bulk-niobium cavities operating in superfluid helium via second-sound detection. This method cannot be applied in non-superfluid helium, where contact thermometry will be an alternative for niobium-coated copper cavities. The candidate will resume development of a contact-thermometry system for these cavities, including multiplexed data acquisition for large thermometer arrays, review the mechanical design of the supporting system for different forms of cavities, produce and test prototypes, then test on real cavities in the SM18 facility. Heat transfer modelling in normal and superfluid helium and cavity material will support the study, in particular for near-contact temperature evaluation.

Training Value
You will work in a large collaborative environment on R&D related to superconducting thin films, superfluid helium cryogenics, radiofrequency. You will get familiar with experimental techniques in low temperature material science, heat transfer calculation, instrumentation and data acquisition.

Job specific Requirements

- Thermal and material physics
- CAD tools
- Data Acquisition
- Previous experience in thermal calculation, cryogenics, and thermometry would be an asset.

Additional Information
CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

2. Electronics Engineer for Development of Radiation Tolerant Mixed Signal Design Kits

- Geneva, Switzerland
- Full-time

Job Description

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The EP-ESE-ME Section is responsible for the designs of integrated circuits to be used in the CERN experiments. You will have unique training opportunities in the area of microelectronics design tools and microelectronics design.

Functions

• Development of a mixed signal design kits for 65-nm & 130-nm CMOS processes.
• Development of a mixed signal design kit for a more advanced 28-nm CMOS process.
• Development and verification of design workflows.
• Support of these design kits to the designers from our collaborating institutes.

Training Value

You will acquire knowledge in the following areas:
• Microelectronics design tools
• Microelectronics design

Job specific Requirements

- Master in Electronics Engineering with specialization in microelectronics design
- Design and development of microelectronics circuits
- Ability to use EDA tools for mixed mode microelectronics design

Additional Information

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3. Electronics Engineer in Radiofrequency Measurement

- Geneva, Switzerland
- Full-time

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The CLIC study is developing a high power RF system at 1 GHz for the drive beam with unprecedented high-efficiency and RF stability requirements. A test stand has been built to study multi-beam klystrons and measure the output power with high precision. The low-level RF system is a critical part of the experiments. You will be in charge of optimizing the low-level RF system and performing precision measurements of amplitude and phase of the RF output power. A feedback system should be developed to further stabilize the output power.

Functions

You will optimize the low-level RF system and perform precision measurements of amplitude and phase of the RF output power. A feedback system should be developed to further stabilize the output power.

Training Value

You will work within the international CLIC collaboration and contribute to a study of a future high-energy physics accelerator at CERN. You will learn about high-power RF amplifiers, precision measurement techniques and data analysis

Job specific Requirements

- Master in Electronics Engineering.
- Experience in high frequency electronics and feedback system would be an advantage.
- Programming of controls software.

Additional Information

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- Health insurance cover from a Spanish Insurance company.

4. Electro-Mechanical Engineer working on Large Superconducting Magnets

- Geneva, Switzerland
- Full-time

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The position is opened in the TE-MSC-LMF Section. The Magnets, Superconductors and Cryostats Group is responsible for the design, construction and measurements of superconducting and normal conducting Magnets for the CERN accelerator complex. The Large Magnet Facility Section provides CERN-wide support for the engineering, manufacturing and maintenance of superconducting accelerator magnets.

Functions

You will participate in magnetic measurements in particular on large superconducting magnets for HL-LHC. Such measurements will be used at ambient temperature during the assembly phase of magnets / cold masses as a complementary tool for early detection of non-conformitities (such as electrical insulation faults or improper shimming). The work encompasses the design of the systems, involving mechanical and electronic aspects, their assembly and integration, their on-field validation, the implementation of the required automation software, and finally their operation.

Training Value

You will acquire knowledge in the following areas:

Manufacturing of superconducting accelerator magnets and cold masses, and development of the relating cutting edge technologies, in particular magnetic measurements. These techniques are also used for other types of magnets, such as for example resistive ones.

Job specific Requirements

- Master degree in electro-mechanical, mechatronic, or electronic engineering
- Knowledge of magnetic measurement techniques, magnetic sensors, and associated data acquisition systems and post-processing
- Ability to carry out hands-on work; Knowledge of structural and magnetic analysis codes, e.g. Ansys, OPERA, ROXIE

Additional Information

CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

5. Safety/Environmental Engineer or Mechanical/Civil/Electrical Engineer

- Geneva, Switzerland
- Full-time

Job Description

The CMS experiment is one of two "general purpose" detectors operating at the Large Hadron Collider. Following 20 years of design, construction and commissioning, in 2012 the collaboration announced the discovery of the Higgs Boson, one of the missing pieces in the so-called "Standard Model" of particle physics. Since 2012 CMS has been accumulating huge amounts more data, refining its measurements of the Higgs boson and other sub-atomic particles, and searching for new phenomena. The success of CMS and the LHC is such that it is now planned to continue operation beyond its original lifetime (around 2023) for at least a further 12 years, with the LHC at that point being upgraded to provide a factor of 5 more collisions. The CMS experiment is located 100m below ground in a dedicated "experimental cavern". A second cavern houses electronics, cryogenic systems, computing etc. Safety is of paramount importance and, with such a huge variety of infrastructure and cutting-edge technology, maintaining the existing safety systems and improving upon them is extremely challenging. The successful candidate will work in an international collaboration within the Safety, Coordination and Infrastructure (EP-CMX-SCI) section of the CMS Experimental Physics Group.

You will collaborate with the CMS Safety office in the context of the LHC Long Shutdown 2 (2019-2020) and support the major safety systems maintenance (corrective and preventive) and upgrade. In particular, you will liaise with the CMS Engineering and Integration team to ensure new safety systems integrate with the existing CMS infrastructure correctly and efficiently. You will also help with risk assessment of new complex safety systems and coordinate with other non-CMS CERN teams to ensure the maintenance and upgrades are performed to schedule and achieve their goals.

As an independent project officer for the CMS Safety office, you will work on the current Computerized Management Maintenance System (CMMS):

Equipment:

• Establish comprehensive listing of all CMS safety systems and assets
• Organize equipment by giving it a structure (systems, functional positions, assets, parts…) and dependencies
• Upload content to the CERN Infor EAM database
• Integrate with CMS or CERN existing infrastructure
• Trace equipment (labelling and location update)

Maintenance:

• Automate and systematize the process of managing maintenance
• Plan maintenance, scope, periodicity, resources, assignment, instructions…
• Implement preventive maintenance schedules in the Infor EAM database
• Test and consolidate the full maintenance process with other safety officers

Documentation management:

• Collect existing documentation from different sources (CERN-specific document management system EDMS, safety folders, experts…)
• Link EDMS (CERN Engineering Document Management System) and other CERN online systems to the Infor EAM equipment data base

Optional additional topics depending on your interests:

• Design fast-access to equipment data, and work order creation (QR codes, links, augmented reality…)
• Comparison with the existing CMS-specific CMMS, and input in the migration discussion
• Training personnel to using the new CMMS

Job specific Requirements

- Master in safety, environment or mechanical or other engineering subject
- Some understanding of controls and automation

- Basic knowledge of 3D modeling and FEA/structural analysis, in order to liaise with the CMS Engineering and Integration team efficiently
- Good personal and interpersonal management skills

Additional Information
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- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

6. Electro-mechanical Engineer for Nb3Sn and HTS Coil Production, Magnet Assembly and Qualification Measurements during Production

- Geneva, Switzerland
- Full-time

Job Description

Within the HL LHC and FCC projects, the TE-MSC/MDT section is in charge of the design and construction of model magnets. The design of the HL LHC magnets is well advanced and presently main components and tooling are in fabrication or being commissioned. For the FCC the development of model magnets has started and first models, with Nb3Sn and HTS conductors are being manufactured.

For this position we are ideally looking for an electro-mechanics engineer or equivalent.In this project you would actively participate within a team of engineers and technicians, on Nb3Sn and HTS (High Temperature superconductor) coils production, instrumentation and their dimensional control, magnet assembly, assembly tooling development and electrical measurements during magnet construction. Therefore, knowledge in mechanical measurements and 3D drawing software would be an asset but not mandatory.

The functions would be the following:

• Participate on Nb3Sn and HTS coil manufacturing and instrumentation
• Participate on dimensional control of coils and components,
• Participate on magnet assembly and assembly tooling development

Job specific Requirements

- Master in electro-mechanical engineering or equivalent
- Knowledge in the dimensional measurements and 3D drawing software would be an asset
- Team working spirit

Additional Information

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- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

7. Development of Industrial Control Systems for Cooling and Ventilation Plants

- Geneva, Switzerland
- Full-time

Job Description

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Within the CERN engineering department (EN), the Cooling and Ventilation group (EN-CV) is in charge of the production, operation and maintenance of cooling and ventilation plants for accelerators tunnels, experimental cavern and technical buildings (en.web.cern.ch/en-cv-group).

Functions

You will be integrated in a CV team in charge of the specifications, of the development and of the commissioning of distributed Industrial Control Systems (ICS) for a large set of CERN cooling and ventilation plants.

These ICS are implemented with a CERN suite of software tools – UNICOS - which is used for the controls of a large variety of industry like CERN plants (e.g. cooling and ventilation plants, LHC cryogenic plants, LHC experiment gas systems). This suite generates code for Siemens and Schneider Programmable Logic Controllers (PLC) as well as for the WinCC OA Supervision Control And Data Acquisition (SCADA) system. You will design and develop the PLC and SCADA code, select the proper close loop solutions and will be responsible for their tests (with simulator and in situ) and for their commissioning.

Training Value

- You will be integrated in a team working for a domain which you can find in the industry – cooling and ventilation plants – but with plants of a very unusual size and complexity.
- You will have to opportunity to get familiar with state of the art automation tools (PLCs, SCADA systems and code generators) and to practice with the programming of PLCs and SCADA widely used in the industry as well as with the automation (selection and tuning of regulation loops).
- As far as the Industrial Control Systems are concerned, you will be involved in all the production phases from users' requirements capture to commissioning including virtual commissioning with simulators.
- Domains: C&V, Automation, industrial computing.
- Technics: PLC, SCADA, virtual commissioning
- Variety of tasks: User Requirements definition to Commissioning

Job specific Requirements

- Master in Computing Enginering, Automation
- Industrial computing
- Automation
- PLC programming

Additional Information

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8. Industrial Control Engineer for the follow-up of the BIDs monitoring tools

- Geneva, Switzerland
- Full-time

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The EN-SMM-MRO Section is responsible for the beam intercepting devices (BIDs) within the EN-SMM group. You will have unique training opportunities in the area of industrial controls, machines operation and signal processing.

Functions

• Follow up of operational software tools to monitor beam intercepting devices
• Follow up the operation of the LHC Collimators
• Follow-up of algorithms for position signals treatment
• Establish intervention procedures in case of mechatronic failures

The exact work area will be tailored to your skills upon your appointment.

Training Value

You will acquire knowledge in the area of mechatronics and industrial controls.

Job specific Requirements

- Master in industrical control
- Knowledge of signals processing algorithms and tools like Matlab
- Knowledge of PLC programming
- Knowledge of Windows and Linux operating systems

Additional Information

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9. Software Developer in the CAD and PLM domain

- Geneva, Switzerland
- Full-time

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The CERN CAD service provides mechanical CAD software and corresponding data management system plus dedicated tools for the CERN design and engineering community.

CERN'S official CAD tool is CATIA V5 with the Enovia SmarTeam as the Product Data Management system (PDM). CATIA V5 is a powerful 3D CAD tool that in addition to mechanical design, provides a large number of trade-specific software modules such as kinematic, piping, sheet metal design and digital mock-up. Moreover, SmarTeam will be superseded in the near future and new tools and methods will need to be put in place by the team in the coming years. You will join the team of CAD and PLM experts in the CERN CAD Service to:

Functions

- Participate in technical applications design and development including porting or creating new apps for a new PLM system. Typical application areas include: CAD Data Management, CAD and viewer automation, apps to aggregate data from CAD and other systems, tools to enhance data exchange in worldwide design collaborations.
- Assist CAD and PLM experts to formulate and implement applications requirements specifications, develop high level data and process model, design specifications, and test- and user- documentation.
- Design, develop and maintain utilizing object oriented, web-based, and RDBMS technology. The development languages and techniques include .NET, Java, SQL and web technologies. It also includes using the languages of the application programming interfaces (APIs) of the commercial tools.
- Perform software code analysis, programming, software review, testing, delivery, and support.
- Learn and understand the use cases related to the developments, in particular the context of the mechanical CAD software and data management system at CERN.
- This job also include studying specific needs for possible new apps. The job will also include writing technical specifications, testing and writing user guides for the developments.

Training Value

This is a challenging opportunity to gain experience in programming/software development: Creating, testing and documenting new and amended programs; software development processes and techniques. It is also a unique opportunity to learn and work with several commercial PLM systems.

Job specific Requirements

- Databases: Oracle.
- Information Technologies: Building web applications (e.g. with jQuery, HTML5), Using software development tools (e.g. Git, Jira, Trac).
- Programming Languages: C#, Java, Javascript, SQL, PL/SQL or similar.
- The experiences required for this post are: Working knowledge of NET or Java Enterprise); web technologies (such as ASP, HTML5, CSS, JavaScript) as well as knowledge of relational databases and SQL. Expected to foremost work with .NET or Java Enterprise depending on the application.
- Knowledge of 3D CAD and data management is a plus.
- Language competencies:
    - English: Spoken and written, with the ability to draw-up technical specifications and/or scientific reports and to make oral presentations.

- The ability to understand and speak French in professional contexts would be an advantage.

Additional Information

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10. Electronics Engineer for Modeling and Design of Data Readout for CMS Calorimeter Upgrade

- Geneva, Switzerland
- Full-time

Job Description

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CERN and our professionals very much enjoy sharing their knowledge and expertise with recent graduates from university or higher technical institutes seeking further training in a wide area of projects and who are committed and passionate about their chosen field.

The CMS experiment is one of two "general purpose" detectors operating at the Large Hadron Collider. Following 20 years of design, construction and commissioning, in 2012 the collaboration announced the discovery of the Higgs Boson, one of the missing pieces in the so-called "Standard Model" of particle physics. Since 2012 CMS has been accumulating huge amounts more data, refining its measurements of the Higgs boson and other sub-atomic particles, and searching for new phenomena. The success of CMS and the LHC is such that it is now planned to continue operation beyond its original lifetime (around 2023) for at least a further 12 years, with the LHC at that point being upgraded to provide a factor of 5 more collisions. This imposes challenges on CMS, with some existing components not being able to survive. Amongst the most challenging upgrades planned for CMS is a new calorimeter system, called HGCAL, a silicon-based detector, the largest Si detector ever built for particle physics. The project will be within the HGCAL collaboration, specifically in the electronics group of CERN (EP-ESE).

Functions

A high complexity and high efficiency network needs to be built to transport an unprecedented amount of raw data from the HGCAL detector to external electronics and filtering computers. For this purpose a highly complex digital integrated circuit must be realized in a 65nm technology and is expected to be used to aggregate data from several front-end chips and share optimally the available optical links. The design of this component requires a sophisticated system level model of the data traffic expected that would clarify the required bandwidth per module, the length of buffers, the data losses etc. Such a model has to be developed in detail before actual hardware will be designed, taking its input from occupancy data generated by Monte Carlo simulation programs and reasonable expectations about the technologies that could be used in such a project. It also requires a sophisticated verification environment to be put in place, again accepting "real data" from the physics Monte Carlo and producing an output verifiable against the expectation of the physicists.

You will perform the following:

• Work closely with physicists and electronic engineers to develop a sophisticated model of the HGCAL electronics chain

• Use this model to determine critical parameters for the design of the HGCAL front-end ASICs, including the bandwidth required, the lengths of on-detector data buffers and the number of optical links required to support the expected traffic

• Also use the model to estimate communication related error rates and possible mitigations

Training Value

You will acquire knowledge in the following areas:

• Designing large and complex digital systems using state-of-the-art design tools and methods.

• Work in a multicultural stimulating environment with physicists and engineers on the most ambitious detector project in the world of particle physics!

Job specific Requirements

- Master in electronic engineering

- Fundamentals of digital electronics and communication networks
- Competence in hardware description languages for electronics (e.g. Verilog, VHDL…)
- Good communication skills

Additional Information
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- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

11. Electronics Engineer or Applied Physicist for next Generation Optical Links for CMS Calorimeter Upgrade

- Geneva, Switzerland
- Full-time

Job Description

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Functions

The Versatile Link plus project is designing high-speed optical data transmission systems for the readout and control of particle physics experiments in the next decade. These systems will operate at up to 10 Gb/s data rates within upgrades to existing particle detectors. The final implementation in the different detector systems is very application specific and depends upon the exact requirements in terms of final environment (e.g. temperature, radiation) matched with the mechanical constraints that come from the overall design of the detectors. A particularly challenging detector is the HGCAL, due to its density and thus limited space for optical components. You will join the design team developing the optical links in order to understand and integrate the optical links into the various detector systems, including the HGCAL.

You will perform the following:

• Understand the optical system design, as well as the designs of the various detector systems, especially the HGCAL, and find solutions that best match the two

• Evaluate and test the high-speed performance of candidate components under varying environmental conditions (e.g. temperature, radiation)

• Once the final candidates have been identified there will be opportunities to integrate the actual optical components into real user systems and participate in test campaigns.

Training Value

You will acquire knowledge in the following areas:

• Be at the forefront of radiation-tolerant optical transmission technology, to be used by the particle physics community for the next decades

• Gain experience in the testing and evaluation of high-speed optical communications components and systems

• Work in a multicultural stimulating environment with physicists and engineers on the most ambitious detector projects in the world of particle physics!

Job specific Requirements

- Master in electronic engineering or applied physics
- Fundamentals of communication networks, specifically optical components
- Ability to understand complex engineering designs of the particle detectors, to understand the integration issues

- Good communication skills

Additional Information
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- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

12. Electronics Engineer or Experimental Physicist working on the Definition, Selection and Implementation of Instrumentation for Superconducting Cables and Current Leads

- Geneva, Switzerland
- Full-time

Job Description

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The Engineer or Physicist will work on the definition of the instrumentation needs and on the selection and implementation of the instrumentation for superconducting cable systems.

Functions

• Understand the operation of the complete SC-Link system
• Define the instrumentation requirements of the cryostats, MgB2 cable & current leads used in the SC-Link
• Physically instrument the various sensors (temperature, pressure, flow…)
• Define the wiring and routing of the various components to a data-logging system
• Analyse and assess the results
• Recommend the requirements and control system for the SC-Link in the Tunnel

Training Value

You will:

• Develop your team and communication skills
• Learn how to present your ideas convincingly
• Become familiar with helium, cryostat design, current leads and superconductors
• Understand risk and control mechanisms in a large project environment

Job specific Requirements

- Master in Experimental Physics or Electronics
- Being able to work in a multicultural environment
- Being experimental i.e. 'hands-on'
- Having knowledge or an interest in IT and especially in data-logging systems
- Having an awareness of sensors and sensor technologies
- Keen to learn about helium, cryostats, current leads and superconductors

Additional Information

CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

13.Software Engineer for the Design and Implementation of Software for Beam Position Monitors

- Geneva, Switzerland
- Full-time

Job Description

Welcome to the Spanish Trainee Programme FTEC (Formacion en Tecnologias Estrategicas del CERN)!

CERN and our professionals very much enjoy sharing their knowledge and expertise with recent graduates from university or higher technical institutes seeking further training in a wide area of projects and who are committed and passionate about their chosen field.

Beam Position Monitors (BPM) play a key role in diagnostics in the CERN accelerator complex providing vital information to optimize accelerator operation. Numerous BPMs are installed at various locations throughout the CERN accelerator complex. By combining thousands of BPM measurements, operators in the CERN Control Center (CCC) can monitor and correct the position of the particles in a given accelerator. To acquire the positions, several C++ real-time servers are in place to configure and monitor the electronic acquisition cards connected to the BPMs.

The configuration and low-level monitoring of the systems is facilitated by expert Graphical User Interfaces (GUIs) developed in Java. The aim of these GUIs is to abstract the complexity of the underlying systems in a convenient and user-friendly way, allowing experts to configure and diagnose problems on the systems easily and efficiently.

Several BPM systems are scheduled to be upgraded during the next few years, and the Beam Instrumentation Software Section has been requested to provide C++ real-time servers and expert GUIs to accompany these upgrades.

Functions

You will design and develop software using the software tools and technologies (C++ and Java) used by the Software section of the Beam Instrumentation group.

More specifically you will :

• Collaborate with experts from different fields to identify and specify designs of expert GUIs for:
  - the new SPS orbit measuring system
  - the new LHC Interlocked BPMs
• Design and develop the expert GUIs based on the agreed specifications
• Assist in adapting other aspects of the C++ real-time software

Training Value

You will have the opportunity to work in an international team and gain experience in designing and developing software for a large operational control system.

Job specific Requirements

- Master's degree in the field of Computing, Computer Science, Software Engineering or equivalent.
- Programming / software development: Java or C++ experience is essential. Experience in GUI development would be an advantage
- Ability to elicit requirements from experts in order to create software specifications

Additional Information

CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

14. Mechanical Engineer working on the Dimensional Control of Nb3Sn Coils and Magnet Assemblies

- Geneva, Switzerland
- Full-time

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Within the HL LHC project, the TE-MSC/MDT section is in charge of the design and construction of model magnets, in particular for the insertion regions. The design of those magnets is well advanced and presently main components and tooling are in fabrication or being commissioned.

Functions

You will actively participate within a team of engineers and technicians to the dimensional control of the Nb3Sn coils, magnet components and tooling for their acceptance. Based on measurements results, an optimization of tooling and components fabrication process, as well as assembly steps is expected. The very tight fabrication and assembly tolerances imply the use of specific 3D measuring system as a " Faro arm" or if necessary optical measurements as laser trackers. Therefore, knowledge in the dimensional measurements would be an asset but not mandatory.

All functions:

- Dimensional control of the Nb3Sn coils,
- Dimensional control magnet components and tooling for their acceptance.
- Based on measurements results, optimize the tooling and components fabrication process
- Optimize magnet assembly steps

Training Value

You will acquire knowledge in the following areas: Dimensional measurements and magnet assembly

Job specific Requirements

- Master in mechanical enginering (MSc) or equivalent
- Knowledge in the dimensional measurements would be an asset
- Good soft skills especially in the domain of working in a team and communication

Additional Information

CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
- A monthly take-home pay of 4,128 Swiss francs;
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15. Test engineer for superconducting magnets and superconducting links

- Geneva, Switzerland
- Full-time

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The TF Section (Superconducting Magnet Test Facilities) is responsible for :

- the existing and future superconducting magnet test facilities at CERN,
- cold powering test technology and instrumentation,
- testing of superconducting magnet and their components, as well as other large scale superconducting devices such as current leads and superconducting links.

Within this project you will be responsible for:

- Preparing test plans with magnet designers
- Coordinating test at room and low temperature with technicians and engineers
- Making analysis of test results data and report on it

You will acquire knowledge in the following areas:

Superconductivity, Cryogenics, Measurement techniques with electrical and optical sensors, Coordination of large and interdisciplinary team, working in team, programming

Job specific Requirements

- Master in mechanical engineering, electrical engineering, industrial engineering, applied physicist
- Good programming skills
- Fast learning (knowledge in LabView and control in general would be an asset).
- Behavioural competencies:
    - Managing self : working autonomously, use time effectively and efficiently
    - Achieving results: delivery high quality work, rigorous, organised and structured
    - Communicate effectively: listening to others and provide others with information
    - Working in teams

Additional Information

CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

16. Electronics Engineer working on Pulse Generators for the LHC Beam Dump Systems

- Geneva, Switzerland
- Full-time

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The PPE (Pulsed Power Engineering) section acts as the hub for pulsed power and high voltage engineering for kicker systems. The section is responsible for R&D processes on ABT pulsed power technologies and contributes to the successful and reliable operation of fast pulsed systems throughout the CERN accelerator complex.

Functions

In the framework of the LHC consolidation project, the TE-ABT-PPE section is responsible for the upgrade of the LHC beam dump system pulse generators. These generators produce pulses of up to 30kV and 20kA with a rise time of about 2µs.

- Take part in the procurement and acceptance of components, validation measurements of upgraded GTO thyristor stacks, associated trigger transformers and complete pulse generators. You will also have the chance to participate in HV test of the system in the LHC tunnel.
- Follow up and improve if necessary the data quality of consolidation program planning and document the test results.
- You may contribute to feasibility studies for a future impact ionisation switch where the design of a fast HV trigger circuit is foreseen as well.

Experienced CERN staff will be available to supervise the outlined activities

Training Value

You will acquire knowledge in the following areas:

- Design of HV pulse power generators and construction
- High voltage Engineering, instrumentation, measurements and testing
- Analogue and mixed signal circuit design
- Follow-up with CERN's main workshop and subcontractors, scheduling of tasks and validation of parts and components

Job specific Requirements

- Electronic circuit design
- Analogue circuit knowledge
- Willing to help hands on for assembly technology (e.g. use of oscilloscope)
- Good voltage engineering would be an asset

Additional Information

CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

17. Computer Engineer in CERN's Analogue Signal Acquisition System

- Geneva, Switzerland
- Full-time

Job Description

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The Controls Group in the Beams department is responsible for the specification, design, procurement, integration, installation, commissioning and operation of the controls infrastructure for all CERN Accelerators, their transfer lines and the Experimental Areas. Support is also provided to the technical infrastructure services that rely on standard controls facilities provided by the group.

OASIS (Open Analogue Signal Information System) is a system developed at CERN to acquire analogue signals from devices in the particle accelerators and display them in a convenient, graphical way. It is used by equipment specialists, engineers and operators in order to watch the behaviour of a wide variety of systems in real-time.

Functions

Integration of the new digitiser families in COHAL and the FESA classes:

• Vertical integration and validation in OASIS

• Evaluation of the driver and the hardware access interface provided by the suppliers

• Evaluation of the digitiser functionality and control provided by the suppliers

• Requesting firmware, driver or hardware access library modification if necessary

Training Value

You will learn to work in a software engineering team using state-of-the-art software engineering practices (Scrum-like), gain experience in real-time embedded software architectures and distributed communication protocols (MQ) and participate actively in the operational service support directly linked to the operation of the CERN Accelerator complex (LHC and injectors).

Job specific Requirements

- Master in Computing Engineering
- C++ developer with sound knowledge in Object Oriented Programming, Design Patterns and Realtime Programming
- Advanced knowledge of Linux development and runtime environment
- Affinity to hardware, understanding the principles of Hardware/Software Co-design
- Capability to work in close collaboration with hardware designers, driver developers and the installation experts
- Good knowledge of either English or French.

Additional Information

CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

18. Mechanical Engineer for the Design and the Construction of Cryogenic Devices and Systems

- Geneva, Switzerland
- Full-time

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CERN and our professionals very much enjoy sharing their knowledge and expertise with recent graduates from university or higher technical institutes seeking further training in a wide area of projects and who are committed and passionate about their chosen field.

The TE-CRG-ME section is responsible for the design and the construction of cryogenic systems and devices at CERN. You will be provided with unique training opportunities in the area of cryogenic engineering, mechanical engineering, thermo-hydraulic calculations, system integration and project management.

Functions

• Definition of the modifications to the existing cryogenic infrastructure of the SM18 test facility required by the High Luminosity LHC String of Magnets
• Mechanical design and 3D integration of the required cryogenic distribution system.
• Sizing of the cryogenic devices like valves, piping, buffers, etc.
• Contribution to the preparation of the specifications for industrial procurement.
• Preparation of the project plan for the procurement and installation of the systems

Training Value

You will acquire knowledge in the following areas: Cryogenic engineering, mechanical design, 3D design, mechanical calculations, system integration, thermo-hydraulic calculations, definition and sizing of flow control and safety devices, assembly technologies, vacuum technologies, thermal insulation, definition of industrial procurement specifications, usage of industrial norms and project management.

Job specific Requirements

- Master in Mechanical Engineering
- Mechanical design
- Material properties
- Good basis of thermodynamics and fluid flow
- Good knowledge of computer spreadsheet and text processing tools
- Ability to write documents in English

Additional Information

CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

19. Mechanical Engineer for the design and construction of high power Radio Frequency (RF) devices

- Geneva, Switzerland
- Full-time

Job Description

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CERN and our professionals very much enjoy sharing their knowledge and expertise with recent graduates from university or higher technical institutes seeking further training in a wide area of projects and who are committed and passionate about their chosen field.

The BE-RF-PM section is in charge of RF power devices over all CERN's accelerator complex and is looking for a recently graduated mechanical engineer to consolidate its team.

Functions

By reinforcing the team you will be involved at all stages of the design, construction and tests of high power RF hybrid combiners, a fantastic object being a mix between mechanics and RF power. The second main topic will be to be involved at all stages of the design, construction, clean room assembly, and tests of innovative RF power devices for Hi-Lumi project. A senior technician will mentor you all along the projects.

Training Value

You will have the opportunity to become a skilled mechanical engineer in various fields of expertise. This includes CAD, conventional and modern machining, 3D fast prototyping, EBW, Laser welding, subcontracting follow-up, assembly, clean room tooling, vacuum technology and RF measurements.

Job specific Requirements

- Master in mechanics
- Conception of mechanical objects
- Use of CAD (Catia, Ansys)
- Machining
- Metrology
- Installation and tests of equipment

Additional Information

CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
- A monthly take-home pay of 4,128 Swiss francs;
- 2.5 days of paid leave each month
- Health insurance cover from a Spanish Insurance company.

20. Electronic/Electrical Engineer working on the Development of Quench Protection Systems for Superconducting Magnet Circuits

- Geneva, Switzerland
- Full-time

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The electrical engineering section (EE) within the TE-MPE group is responsible for the R&D, design, production, operation and maintenance of state-of-the-art technology for superconducting magnet circuit protection and the electrical quality assurance of the Large Hadron Collider.

Functions

• Development and preparation of industrialization of the Coupling Loss Induced Quench project as a new method of quench protection for High Luminosity LHC magnets, based on the discharge of capacitor banks as energy storage with thyristors as switching elements into the magnet coils.

• Tools and methodologies of electrical integrity and quality assurance for the lifetime studies of capacitive energy storage systems of the LHC quench heaters, which are installed in the machine environment and therefore being exposed to ionizing radiation and increased environmental stress.

• Dependability engineering studies of machine protection hardware, considering requirements in terms of reliability and availability of the protection components while at the same time respecting the applicable industrial quality standards.

Training Value

You will acquire knowledge in the following areas:

Design, prototyping, testing and industrialization of electrical and electronic power systems, construction follow-up in close collaboration with CERN's services and industry, including specifications, electrical measurement techniques, dependability engineering.

Job specific Requirements

- Master in electrical engineering, electronic engineering or similar
- Initial experience in the construction and testing of electrical and electronic power systems would be an asset.

Additional Information

CERN would very much like to benefit from your expertise, commitment and passion. In return, you will be provided with:

- A contract of association of one year, renewable for a second year;
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