



MINISTERIO
DE ECONOMÍA, INDUSTRIA
Y COMPETITIVIDAD



Project title:

High field superconductors' technology for particle accelerators

Job description:

The open position has a duration of 1 year and is in experimental physics /engineering, in the general area of mechanical properties of superconducting tapes, with the following focus directions:

- Study of low temperature welding techniques for superconducting tapes compatible with high-vacuum.
- Study of the mechanical properties at low temperatures of superconducting tape /steel stacks.
- Study of the effect of mechanical strain and bending radius in the critical current of superconducting tapes.

The position will involve use of cryogenic equipment, digital image correlation technique and electric and magnetic characterization techniques.

ICMAB offers an excellent working environment, including:

- a creative, world-class interdisciplinary research environment for fundamental and applied nanoscience state-of-the-art infrastructure for the fabrication and characterization of nanostructured materials.
- a highly regarded scientific education.
- a strong international science network.

Research Project:

The future circular hadron-hadron (FCC-hh) collider is a CERN study for a next generation particle accelerator aiming at 100 TeV center-of-mass collision energy in a 100 km circumference ring. A beam screen shall absorb the synchrotron radiation generated by the proton bunches and shield the 1.9 K cooled magnets used to steer the beams. State-of-the-art Cu-based technology used in the beam screen chamber of the large hadron collider operates down to 4.2K. For the FCC-hh, having the 100 km beam screen operating at 4.2K is economically and energetically not viable. A more energetically efficient and greener option is to hold the beam screen at around 40K – 60K. Unfortunately, Cu in this temperature range will not provide low enough beam coupling impedance.

To overcome these challenges, we propose to use RE(=Y,Gd)Ba₂Cu₃O_{7-x} (REBCO) coated conductors (CC) to overlay the beam screen chamber. The metallic substrate of the CC will need to be high-vacuum compatible welded to the stainless-steel beam screen chamber. The superconducting layer will need to provide low enough beam coupling impedance at 50 K, and it will have to be covered with a protective layer to inhibit the generation of an electron cloud that would otherwise destabilize the proton beam.

Academic background /working experience of the candidate:

- Bachelor in physics or engineering.
- A high level of English.
- High motivation to experimental research.
- Working aptitudes in a collaborative group.



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We invite applications from excellent candidates anywhere in the world.

Contact:

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