1st PACMAN Workshop



Contribution ID: 32

Type: not specified

Stretched wire systems for the magnetic measurement of small-aperture magnets

Wednesday 4 February 2015 09:50 (25 minutes)

Summary

The PACMAN project involves the measurement of the magnetic centers of the main beam quadrupoles to be installed in CLIC (the future Compact Linear Collider) to the micro-meter scale. The magnetic center of a quadrupole magnet is defined as the locus of points where the magnetic flux density is zero. By using a single stretched wire, positioned inside the aperture of the quadrupole, the center can be determined in two different ways. One is to displace the wire in two opposite directions across the center and measuring the voltage induced in the wire loop by the variation in the magnetic flux. The asymmetry of the two measured voltages is then related to the offset between the initial position of the wire and the magnetic center position. This method, referred to as the classical stretched wire method, works well for large aperture, high-gradient magnets.

The second way is to use a vibrating wire, excited by a sinusoidal current at the mechanical resonance frequency, which vibrates due to the Lorentz force. The magnetic center is found by measuring the wire oscillation amplitudes and determining the position where this vibration takes its minimum. Because of its high sensitivity, this method is suitable also for small aperture, low gradient magnets.

This talk will focus on the comparison between the classical stretched wire method and the vibrating wire method for measuring the magnetic center of a reference quadrupole. The two methods will be compared in terms of sensitivity, measurement uncertainty, and repeatability. Some critical aspects of the vibrating wire system will be further discussed.

Presenter: Mr CAIAZZA, Domenico (CERN)

Session Classification: WP2