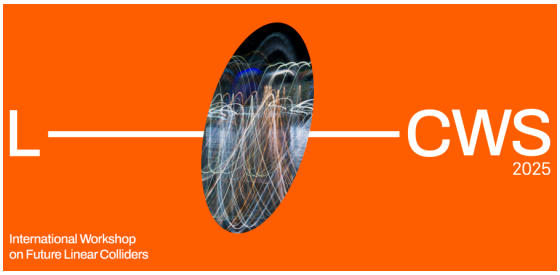

Contribution ID: **195** Type: **Talk**

Preliminary Design of a Conduction-Cooled Superconducting Quadrupole for ILC Main Linac With Large Temperature Margin

Tuesday 21 October 2025 10:00 (15 minutes)

The International Linear Collider (ILC) Main Linac consists of a series of cryomodules, one third of which are composed by eight 9-cell superconducting RF (SRF) cavities and a superconducting quadrupole (SCQ) package. The electrons and positrons are focused by the quadrupole and steered by the two dipoles included in the SCQ magnet. Large expected dark currents are originated at the SRF cavities and deposit energy at the SCQ. The superconductor in the coils should not surpass its critical temperature before that heat deposition is evacuated. This presentation depicts the SCQ electromagnetic design proposed by CIEMAT, comparing different superconductors. Nb3Sn wire is selected for the quadrupole coils relying on the large temperature margin for the absorption in the superconducting coils of the heat deposition from the dark currents. The magnet cross-section has been carefully optimized for the high-energy type of the SCQ magnet to achieve a good field quality and superconductor efficiency in spite of the expected iron saturation. The dipole coils were protected from the heat deposition, enabling the election of Nb-Ti wire. A dedicated test stand is being prepared to evaluate the thermal design of the Nb3Sn coils.

Authors: Mr DURAN, Oscar (CIEMAT); DURAN LUCAS, Oscar (CIEMAT - Centro de Investigaciones Energéticas Medioambientales y Tec. (ES))

Co-author: TORAL, Fernando (CIEMAT - Centro de Investigaciones Energéticas Medioambientales y Tec. (ES))

Presenters: Mr DURAN, Oscar (CIEMAT); DURAN LUCAS, Oscar (CIEMAT - Centro de Investigaciones Energéticas Medioambientales y Tec. (ES))

Session Classification: Superconducting RF systems

Track Classification: Accelerator: Superconducting RF systems