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## Effect of transverse compressive stress on Nb<sub>3</sub>Sn Rutherford cables for accelerator magnets

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The accelerator magnets for the High Luminosity upgrade of the Large Hadron Collider (HL-LHC) use Nb<sub>3</sub>Sn conductor to achieve in-field performance exceeding Nb-Ti based technologies. To sustain the Lorentz forces during operation, a pre-compression is applied to the conductor during the fabrication of the magnet. This can lead to an irreversible degradation due to the mechanical sensitivity of the Nb<sub>3</sub>Sn material.

In this study, the impact of the pre-compression is investigated using a reacted double-stack of Rutherford cables. The stack is submitted to transverse stress at room temperature. The critical current is then measured in liquid helium and in a background field of up to 11.5 T in the FRESCA test station at CERN. The pressure applied at room temperature covers the range from 130 MPa to 190 MPa with a 10 MPa step increase.

Monotonic and cumulated pressures were applied to analyze the impact of the cyclic loading. Microscopic analysis of cross-sections were performed following procedures specifically developed to minimize surface damage during samples' preparation. These observations were used to correlate the irreversible effect of the transverse pressure to the A15 damage in the cross section.

**Primary author:** Dr LENOIR, Gilles (CERN)

**Co-authors:** Dr BARTH, Christian (CERN); WOLF, Felix Josef (CERN); FLEITER, Jerome (CERN); MAL-ABAILA, Marina (CERN); Dr BALLARINO, Amalia (CERN)

**Presenter:** Dr LENOIR, Gilles (CERN)

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