

## Optimisation studies and tests of low-mass support structures for the CLIC vertex detector

*Tuesday, July 1, 2014 9:45 AM (30 minutes)*

*This talk follows the first one proposed by Fernando Ramos about the CLIC Vertex detector design, general requirements and thermal aspects.*

A vertex detector with a barrel and an end-cap section, both composed of three double layers, is under development for CLIC. The strict requirements in terms of material budget ( $2 \times 0.2\% X_0$  per double layer, including  $2 \times 0.1\% X_0$  of silicon for the sensors and readout) necessitate the development of novel low-mass support structures. This presentation focuses on optimisation studies and tests of ultralight full sandwich and open structures (staves) for the CLIC vertex barrel detector. Particular emphasis is put on stave stiffness studies (optimisation and measurements through 3-point bending tests) in view of the maximization of its eigenfrequencies. The mechanical studies, spanning from the stave prototyping program to vibrations studies in a wind tunnel, are shown. Mechanical simulations are compared with measurements on prototypes. In particular high modulus carbon fibres and low-density core materials are studied, as well as the corresponding assembly processes. The amount of material in terms of radiation length is calculated and compared for different stave designs and materials.

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