

# Development of the Service Frame for SBS Tracker GEM and TENDIGEM Development

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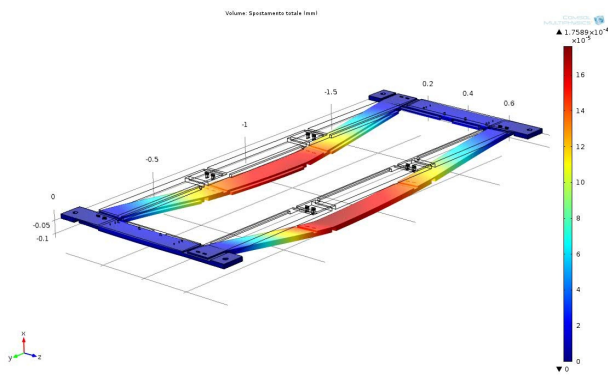
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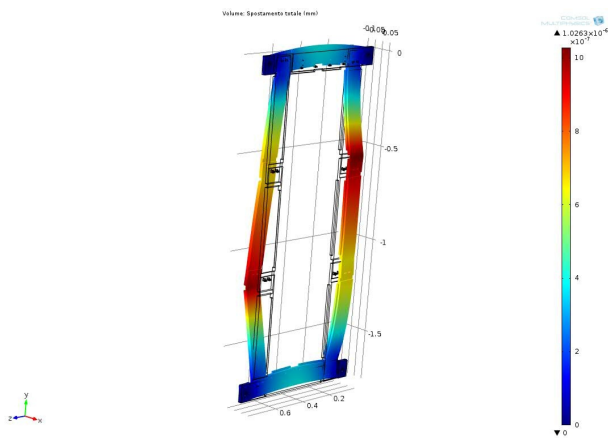
## Abstract

The Gas Electron Multiplier (GEM) technology has been proven to tolerate rate larger than 50 MHz/cm<sup>2</sup> without noticeable aging and to provide the sub-millimeter resolution on working chambers up to 45x45 cm<sup>2</sup> [1]. A new GEM tracker is under development for the upgrade of the SBS spectrometer in Hall A at Jefferson Lab. The chambers of the tracker have been designed in a modular way: each chamber consists of 3 adjacent GEM modules, with an active area of 40x50 cm<sup>2</sup> each [2]. We have defined the procedures for the assembling of the GEM modules and designed a mechanical system (TENDIGEM) that will be used to stretch the GEM foils at the proper tension (few kg/cm); the TENDIGEM is based on the original design developed at the LNF [3]. The support structure of the tracker GEM must be very light, but at the same time it must be also very resistant to the deformation. To this aim it is crucial optimizing the design of the support structure and the choice of the material; carbon fiber is a favorite candidate. In addition to structural stresses of simulations, with code COMSOL, were carried out to show behavior of structure due also to a thermal gradient about 5°. A further step was to simulate stresses undergone by the structure in joint areas where in addition to typical bolting was added a bonding with epoxy resin. Using such a composite material, it is necessary to simulate gluing between different parts of the structure and this has been possible with COMSOL software package.

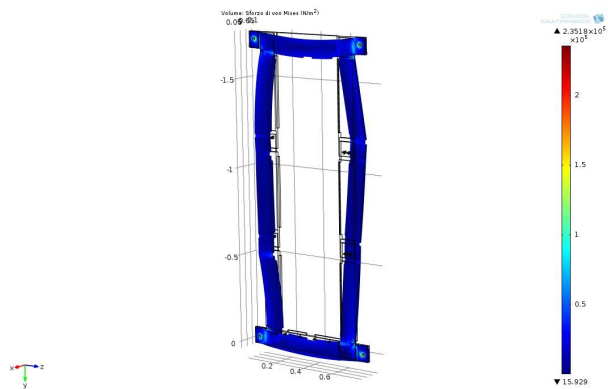
# Figures used in the abstract



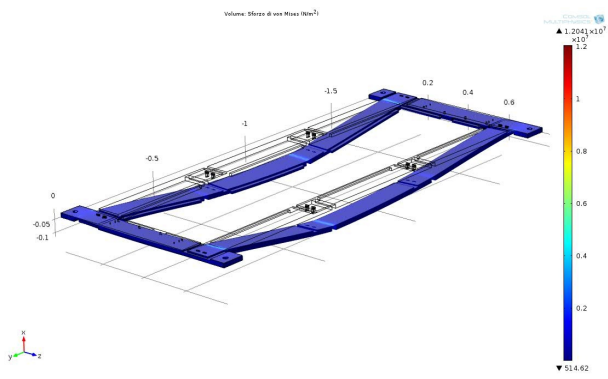
**Figure 1:** Total deformation in support mechanical structure in horizontal position



**Figure 2:** Total deformation in support mechanical structure in vertical position



**Figure 3:** Von Mises stress in vertical position



**Figure 4:** Von Mises stress in horizontal position