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## **Tue-Mo-Po2.05-02 [25]: Strain characteristic exploration for a 5 T superconducting split magnet system of a multi-field test facility**

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This paper deals with the mechanical characteristic and strain profile in a 5 T NbTi superconducting split magnet system, which provides a strong background field for the multi-field test facility established in Lanzhou University of China. The design of the split magnets, composed of 14 coils wound with NbTi wires, was adopted to satisfy a large test space ( $\Phi 100\text{mm} \times 800\text{mm}$ ) for mounting the sample, fixture and sensors. Since the special structure, the mechanical behavior and stress/strain distributions in the coils, supporting structures became more important.

We present results, experimental and analytical, of hoop strains in the split superconducting magnet system, and equipped with strain gauges at their outermost turns. To explore the strain behavior in the magnets, several cryogenic resistance strain gauges (CRSG) with the half bridge compensation are used for the measurements for eliminating noise effects of both temperature and magnetic field. The several hoop strain responses during cooling down and excitation tests of outermost turns of the SC magnets are recorded to show that the split magnet system can be limited well to strain guidelines at the different operation stage, and the hoop strain at magnet's circumference are almost the same during the operation. By strain characteristic exploration in the NbTi superconducting split magnet system, it can indicate that a structure stability for the magnet system during its operation. And based on FE analysis, we also calculate strain field of the split magnet system for the different operation stage, and the predicted results show good agreement with the experiment data.

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