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DCT&CCT superconducting multiplets for HIAF-HFRS

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HIAF (High Intensity Heavy Ion Accelerator Facility) is the new generation heavy ion accelerator under construction in China. The HFRS (FRagment Separator of HIAF) is a fragment separator and also a transfer-line between the Booster Ring and the Spectrometer ring, which has the magnet rigidity up to 25 Tm . It includes 11 superconducting dipoles and 13 sets of triplets. Several multipole magnets (an octupole, a quadrupole and a sextupole) are nested together to compact the length of HFRS-line. All of them have high gradients (11.43T/m, 20T/m², 105T/m³) and large bores (320mm). To reduce the cold mass and ensure the field quality, the whole multipoles are all designed with coil dominated magnet of CCT (Canted Cosine Theta) and DCT (Discreted Cosine Theta). This paper will introduce the generally design process of a HFRS multipole module. The development process and testing results of the prototype will be also presented. manufacture processes and testing results to show the novel magnetic technology research.

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