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Development of new rotating-disk-type production target at J-PARC Hadron Experimental Facility

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At J-PARC Hadron Experimental Facility, a wide variety of nuclear and particle physics experiments has been carried out using secondary particles such as kaon and pion, which are produced in a dense-metal target irradiated by slowly extracted 30-GeV proton beam. A current target is a fixed type made of gold, which is jointed to the water-cooled copper block. The current target is designed to be accepted up to 95-kW proton beam for 5.2-s repetition cycle.

In order to increase an acceptable beam power up to 150 kW, development of a new production target is in progress. The new target is planned to be a rotating-disk type, which distribute heat load to circumferential direction. In the plan, direct cooling by helium-gas blowing to the disk is adopted. The disk is a diameter of 346 mm and a thickness of 66 mm with fin shape to increase an amount of heat transfer.

Material of the new target, which should have properties of high density and high thermal conductivity, is under consideration. Candidates of the material are gold, platinum or tungsten. To determine the material, primitive tests such as machining and surface treatment have been examined to tungsten material.

To support the disk rotation, a helium-gas-lubricated bearing, which is basically no life limitation and also capable of rotating at higher speed than widely-used radiation-resistant ball bearings, has been examined with a real-size disk.

In this report, design and development status of the new target are presented.

Themes for the contribution

4 Target design, analysis, and validation of concepts:

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