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The upgrade of the target multiwire profile monitor for the CSNS-II project

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The beam power is lifted up to 500 kW for the phase II of the China Spallation Neutron Source (CSNS-II) project, which is five times the power of CSNS-I. At the CSNS, the neutron beams are generated by the spallation reaction of 1.6-GeV protons striking on a tungsten target. The multiwire profile monitor (MWPM) in front of the proton beam window is the only instrument for long-term monitoring of proton beam distribution when the protons are delivered to the spallation target. The wire interval of the target MWPM of CSNS-I is 7 mm, which is slightly sparse for beam profile measurements during the beam operation in recent years. To ensure the precisely monitoring and provide accurate signal for the Machine Protection System (MPS) when the beam is abnormal, an upgraded design was proposed and implemented. The design mainly employs the Printed Circuit Board (PCB) technique to route the signal originated from the tungsten wires. Four bias planes comprised of tungsten wires are added to mitigate the crosstalk effect brought about by stray electrons and enhance the secondary emission effect. The minimal wire interval of present design is 2 mm and the whole equipment is more compact compared with the previous one due to the PCB scheme. This paper will detail the design and manufacturing of the CSNS target MWPM.

Footnotes

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Primary author: YANG, Tao (Institute of High Energy Physics)

Co-authors: LIU, Renhong (Institute of High Energy Physics); NIE, Xiaojun (Institute of High Energy Physics); QIU, Ruiyang (Institute of High Energy Physics); XU, Zhihong (Institute of High Energy Physics); LI, Fang (Institute of High Energy Physics); ZENG, Lei (Institute of High Energy Physics); HUANG, Weiling (Institute of High Energy Physics); YANG, Renjun (Institute of High Energy Physics); LIU, Mengyu (Chinese Academy of Sciences); XU, Taoguang (Institute of High Energy Physics); WANG, Anxing (University of Science and Technology of China); MENG, Ming (Chongqing University); LIU, Quanru (University of Chinese Academy of Sciences)

Presenter: YANG, Tao (Institute of High Energy Physics)

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