

二维位置灵敏中子探测器 Am-Be 源测试

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根据中国散裂中子源多功能反射谱仪的需求设计研制了一个以 ^3He 为中子转换体的基于多丝正比室的二维位置灵敏热中子探测器。探测器的有效面积为 $200\text{mm} \times 200\text{mm}$ ，采用高压闭气式工作模式，工作气体为 $6\text{atm } ^3\text{He} + 2.5\text{atm } \text{C}_3\text{H}_8$ ，通过重心法实现位置读出。该探测器在 Am/Be 中子源上进行了测试并对结果进行了分析，结果表明探测器具有良好的 n/γ 分辨能力以及位置线性。但是由于 Am/Be 的通量较低以及复杂本底的干扰，目前测试位置分辨为 $\sigma=4.9\text{mm}$ 。预计在准直热中子束上会有更好的结果。

关键字中子探测器，多丝正比室，Am/Be 中子源，性能测试

Abstract: A thermal neutron detector with a sensitive area of $200\text{mm} \times 200\text{mm}$ originated from the Multi-Wire Proportional Chamber (MWPC) based on the ^3He convertor was constructed for the Multifunction Reflection Spectrometer of China Spallation Neutron Source. It operates with a gas mixture of $6\text{atm } ^3\text{He} + 2.5\text{atm } \text{C}_3\text{H}_8$ filled in a high pressure chamber. Gravity center readout system was used to reconstruct the neutron position. The detector was tested on the Am/Be neutron source. The results show good n/γ discrimination and position linearity. But only a position resolution of $\sigma=4.9\text{mm}$ was obtained since the low intensity neutron source and high background. A much better position resolution would be achieved on a high intensity thermal neutron beam.

Keywords: Neutron Detector, MWPC, Am/Be neutron source, Performance test

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