

基于 4H-SiC 快中子探测器的电流型模拟前端读出电路初步设计

Summary

摘要：基于宽禁带 4H-SiC 材料的辐射探测器在反应堆辐射场中子注量率监测、能谱测量中具有重要应用。本文基于探测器快中子探测效率及探测器输出信号特征，设计了一种高带宽电流灵敏前置放大器的探测器前端电路模型，分析了影响前端电路特性参数主要因素及提高脉冲计数率线性范围主要方法；研究结果为 4H-SiC 探测器电子学系统的建立提供了相关技术参考。

Abstract: The radiation detector based on wide band-gap 4H-SiC material has important applications in neutron fluence rate monitoring and energy spectrum measurement of reactor radiation field. Based on the detector fast neutron detection efficiency and detector output signal characteristics, this paper designs a detector front-end circuit model of high bandwidth current sensitive preamplifier, and analyzes the main factors affecting the front-end circuit characteristic parameters and the main methods to improve the linear range of pulse count rate. The results provide relevant technical reference for the establishment of electronics system of 4H-SiC detector.

Primary author: Mr 马, 勇 (西安交通大学)

Co-authors: HAN, Ning (西安交通大学); XIONG, Yanli (Xi an Jiaotong University); Dr 刘, 书焕 (西安交通大学); Mr 刘, 双瑛 (西安交通大学); Ms 张, 君 (西安交通大学)

Presenter: Mr 马, 勇 (西安交通大学)