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物理

国产Am-Be中子源4.438 MeV γ射线与中子强度比值测量

刘镇洲，陈金象，朱培，李永明，张国辉

北京大学 物理学院 重离子物理教育部重点实验室，北京 100871

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摘要 本工作涉及准确测量国产Am-Be中子源发射的4.438 MeV γ射线与中子强度比值$R=S_\gamma/S_n$的实验方法。中子源的中子发射率用锰浴法进行比对测量。用Φ75 mm×75 mm NaI（Tl）探测器测量中子源的γ能谱；用MCNP程序模拟计算中子引起的γ本底和探头的源峰探测效率。实验与理论计算得到的R值符合得很好。综合评价已发表的R实验值，给出了R推荐值为0.575（1±4.8%）。结果表明，R值可认为是Am-Be源的一标志性特征量。

关键词 Am-Be中子源 4.438 MeV γ射线 中子发射率 MCNP程序

分类号 0571.32

Measurement of 4.438 MeV γ-ray to Neutron Intensity Ratio for Am-Be Neutron Source

LIU Zhen-zhou, CHEN Jin-xiang, ZHU Pei, LI Yong-ming, ZHANG Guo-hui

MOE Key Laboratory of Heavy Ion Physics, Peking University, Beijing 100871, China

Abstract The present research concerns in the accurate measurement of the 4.438 MeV γ-ray to total neutron intensity ratio, namely $R=S_\gamma/S_n$, for homemade Am-Be neutron source. The neutron strength of the source relative to a previously standardized source was determined by the manganese bath technique. The γ-ray spectra of the source were measured using a Φ75 mm×75 mm NaI(Tl) detector. The background induced by neutrons and the absolute full energy peak efficiency of the detector were calculated using the MCNP code. The experimental ratio obtained agrees well with the calculated value. A synthetic evaluated and recommended value of R=0.575（1±4.8%） was given. The experimental R value appears an important characteristic for the Am-Be source.

Key words Am-Be neutron source _ 4.438 MeV γ-ray _ neutron emission rate _ MCNP code

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通讯作者