

物理

### 氟离子碰撞引起的钽L壳层X射线产生截面测量

田野1, 2, 杨治虎3, 张艳萍2, 常宏伟2, 杨浩智2, 徐进章1, 杜树斌2

1.兰州大学, 甘肃兰州 730000 2.中国原子能科学研究院核物理研究所, 北京 102413 3.中国科学院近代物理研究所, 甘肃兰州

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**摘要** 测量了20~55 MeV F<sup>5+</sup>离子和Ta原子碰撞中Ta产生的L壳层X射线。计算了Ta的L各支壳层产生截面的比值和总截面的比值。利用L壳层的辐射跃迁几率、Croster-Kroning跃迁几率和L亚壳层的荧光产额, 将平面波波恩近似(PWBA)和ECPSSR理论计算的电离截面转换为L层X射线产生截面, 并与实验结果进行比较。结果表明,  $\sigma(L_{\beta})/\sigma(L_{\alpha})$ 、 $\sigma(L_{\gamma})/\sigma(L_{\alpha})$ 和 $\sigma(L_{total})/\sigma(L_{\alpha})$ 与ECPSSR理论预测结果吻合较好,  $\sigma(L_{\beta})/\sigma(L_{\alpha})$ 较两种理论预测值均偏小。

**关键词** [平面波波恩近似](#); [ECPSSR理论](#); [产生截面](#); [L壳层X射线](#)

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### Measurement of L-shell X-ray Production Cross Section of Tantalum by 20-55 MeV Fluorine-Ion Bombardment

TIAN Ye<sup>1,2</sup>, YANG Zhi-hu<sup>3</sup>, ZHANG Yan-ping<sup>2</sup>, CHANG Hong-wei<sup>2</sup>, YANG Hao-zhi<sup>2</sup>, XU Jin-zhang<sup>1</sup>, DU Shu-bin<sup>2</sup>

1. Lanzhou University, Lanzhou 730000, China; 2. China Institute of Atomic Energy, P.O. Box 275-46, Beijing 102413, China; 3. Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China

**Abstract** L-shell X-ray was measured for solid target tantalum by 20-55 MeV F<sup>5+</sup> ion. The ratios of tantalum L-subshell production cross sections were calculated according to the experimental data. Radiative transition probability, Croster-Kroning transition probability and fluorescence yield were used to transfer the ionization cross section which was calculated by plane-wave Born approximation (PWBA) theory and the ECPSSR theory to L-shell X-ray production cross section. Then, the results were compared with the experimental results. Reasonable agreement between theory and experiment was observed. However, the ratio of  $\sigma(L_{\beta})/\sigma(L_{\alpha})$  is smaller than the values calculated by the theories of PWBA and ECPSSR.

**Key words** [plane-wave Born approximation](#) \_ [ECPSSR theory](#) \_ [production cross section](#) \_ [L-shell X-ray](#)

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