X-ray emission for 424 MeV/u C ions impacting on selected targets

Zhou Xianming*, Cheng Rui, Wang Yuyu, Lei Yu, Ren Jieru, Liu Shidong, Zhao Yongtao

Institute of Modern Physics, CAS, Lanzhou, 730000, Gansu, China
University of Chinese Academy of Sciences, Beijing, 100049, China
*Corresponding author: zhouxianming@impcas.ac.cn

In inertial Confinement Fusion (ICF), X-ray radiation drives the implosion requiring not only sufficient conversion efficiency of the drive energy to the X-ray but also the highly spatial symmetry. Consequently, it is important to investigate the X-ray radiation in the interaction of high energy heavy ions beam with solid target. In this work, we would like to investigate the X-ray emission induced by high energy heavy ions.

The K-shell X-ray emissions of the selected elements (Ti ~ Zn) are investigated for high energy (424MeV/u) carbon ions impact. The X-ray production cross sections are calculated and compared with various theoretical estimations. It is indicated that, in such high energy collisions, the L-shell electrons of the target atoms are multiply ionized, this lead to a blue shift the K X-ray and an enlargement of the ratio of Kβ to Kα X-ray. The inner-shell ionization induced by high energy heavy ions can be simulated by the BEA model, but the effect of the multiple-ionization should be taken into account when determining the X-ray cross section, which is linearly decrease with the increasing target atomic binding energy in the present work (figure 1).

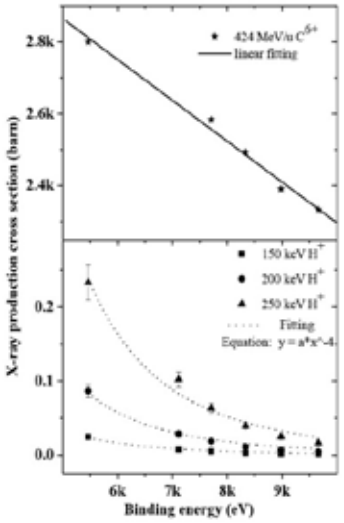

Figure 1. X-ray production cross section as a function of the target atomic binding energy induced by high energy C^{6+} ions and low energy protons.

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