

عنوان مقاله:

Beam shaping assembly study for BNCT facility based on a ۲.۵ MeV proton accelerator on Li target

محل انتشار:

فصلنامه فیزیک تئوری و کاربردی، دوره 12، شماره 4 (سال: 1397)

تعداد صفحات اصل مقاله: 8

نویسنده:

Department of Electrical Engineering, Eastern Macedonia and Thrace Institute of Technology - -

خلاصه مقاله:

Abstract A new study for a boron neutron capture therapy irradiation facility, based on a ۲.۵ MeV proton accelerator on a thick Li target as neutron converter, is presented here. The beam shaping assembly (BSA) modeling has been performed with the use of the MCNP۵ Monte Carlo code. The fast (i.e., > ۱۰ keV) neutron component yielded by the ${}^7\text{Li}(p,n){}^7\text{Be}$ reaction is slowed down through TiF_3 neutron spectrum shifter, while to obtain a high-quality epithermal neutron beam at the beam port exit additional layers for thermal neutrons removal and shielding of gamma rays were used. Moreover, ${}^{60}\text{Ni}$ and $\text{TiF}_3\text{AlH}_4\text{V}$ were selected to filter out and further remove the residual fast neutron component, while cadmium was chosen as thermal neutrons absorber, and bismuth was selected for gamma rays shielding. The therapeutic effectiveness of the proposed BSA was evaluated by performing a set of dose-equivalent distribution calculations in a standard Snyder head phantom. The simulation results show that the proposed BSA modeling meets all the recommended by IAEA criteria and provides one possible technical choice for an accelerator-based BNCT irradiation facility in a hospital environment.

کلمات کلیدی:

BNCT, Li, ${}^7\text{Be}$, proton accelerators, Li target, MCNP۵

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1398248>

