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高能质子加速器治疗系统应用中的环境安全问题

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摘要 通过对1台能量为235MeV的质子加速器治疗系统的辐射安全分析,阐明了高能质子加速器运行时可能带来的一些环境安全问题。分析表明,高能质子加速器运行可能带来的主要环境影响有:中子和γ射线引起的辐射剂量、空气的活化、设备冷却水的活化、土壤(及地下水)的活化、加速器结构材料的活化以及臭氧等有害气体的产生等。计算结果表明,只要整个系统的设计具有良好的屏蔽系统、通风系统以及防止人员误入强辐射区的安全联锁系统,高能质子加速器治疗系统的运行对周围公众的安全是能得到保障的。

关键词 [质子加速器](#) [医疗系统](#) [环境影响](#)

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The Problems of Environmental Safety for Application of High Energy Proton Accelerator Therapy System

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Abstract The environment safety problems resulted from the operation of high energy proton accelerator are described based on the analysis of radiation safety for a 235 MeV proton accelerator therapy system in the paper. The primary environmental impact resulted from the operation of high energy proton accelerator is as follows: 1) radiation dose from neutron and γ-ray to men; 2) the activation of air; 3) the activation of component cooling water of accelerator; 4) the activation of soil (and groundwater); 5) the activation of material of accelerator components; 6) producing harmful gases (such as O₃, NO₂ and HNO₃). The calculated results show that the safety of men around the accelerator can be ensured during high energy proton accelerator therapy system operation, so long as it has fine design and construction for shield system, and ventilation system, and safety interlock system which it is used to protect person going incidentally into the high radiation area.

Key words [proton accelerator](#) [therapy system](#) [environment impact](#)

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