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Comparisons of Prompt Radiation Fields and Material Activations Induced by Four Accelerators in Taiwan

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With an increasing number of large accelerator facilities in Taiwan, the dose assessment and measurement technology for accelerator radiation becomes more and more important. The accelerators of interest include a 3-GeV electron synchrotron in National Synchrotron Radiation Research Center, a 235-MeV proton therapy accelerator in Chang Gung Memorial Hospital, a proposed 400-MeV/A carbon ion therapy accelerator in Taipei Veterans General Hospital, and a 30-MeV high-current proton cyclotron that may be used for an accelerator-based boron neutron capture therapy facility. Radiation fields associated with an accelerator operation differ considerably to those around nuclear power plants or radionuclides in many aspects, such as mixed radiation fields, wide-range energy distributions and specific time structures. These problems result in challenging difficulties in dose assessment and associated radiation measurements. I would like to conduct a comprehensive study on !
the characteristics of prompt and residual radiation fields induced by the operation of the four accelerators. In addition to high-fidelity FLUKA simulations of radiation generation and transport, a high-efficiency neutron spectrometer will be established to measure neutron spectra in workplaces. Key items of my study include: (1) simulations and measurements of prompt radiation induced by accelerator operation, (2) residual activities and remnant doses caused by accelerator radiation induced material activation, (3) general guidelines or suggestions for accelerator radiation protection in Taiwan.

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