STANDARDIZED MODEL FOR AIR ACTIVATION AT ELECTRON ACCELERATOR FACILITIES

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From a radiation protection point of view, electron accelerators bear fewer risks than hadronic accelerators. Nevertheless, apart from hazards due to secondary radiation produced by a continuous or full beam loss of the electron beam, an activation of beam line elements and the air inside the accelerator vault can occur. The amount of activation products must be estimated or measured as they can have an impact on the personnel working on the accelerator site or on the environment.
We use a standard target defined by Hohmann et al. 2014 for the SwissFEL facility at the Paul Scherer Institute in Switzerland in order to assess the activation of air. With the Monte Carlo particle transport code FLUKA we compute the neutron spectrum and the resulting radioactive isotopes in the air around the standard target. From the simulation data we calculate a fitting function for the neutron spectrum and for the activation products. This can be used to compute the activation products resulting from an electron beam hitting the standard target at an arbitrary beam energy between 20MeV and 10 GeV.
This kind of estimates may also be used by regulatory bodies to decide whether it is necessary to monitor the exhaust air of an electron accelerator facility or if there is only a negligible emission of radioactive isotopes even in the case of an uncontrolled full beam loss.