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Design for Radiation Shielding of PAL-XFEL

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The PAL-XFEL is a free electron laser using 10 GeV, 0.2 nC electron beams. The construction started in 2012. In this study, the design for radiation shielding of PAL-XFEL is presented. Beam loss scenario was established, and the bulk shielding was calculated with a consideration of beam loss scenario using SHIELD11 and FLUKA. Several dumps such as the main beam dump, the tune-up dump and spectrometer dumps were designed. To suppress the radiation dose at the experimental area due to the failure of the main dump magnet, which is the major accidental issue in worldwide free electron laser facilities, the permanent safety magnet, collimators and the safety shutter were applied at the front-end. The preliminary design of front-end components will be present. The neutron skyshine effect of the PAL-XFEL was estimated using new evaluation method using FLUKA and PHITS.

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