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A Simulation Study of Neutron Production and Moderation for Axion-like Particles (ALPs) search at Rare Isotope Accelerator complex for ON-line (RAON) WOOYOUNG JANG, University of Texas at Arlington, DOOJIN KIM, Texas AM University, MIN SANG RYU, University of Seoul, KYONGCHUL KONG, University of Kansas, YOUNGJOON KWON, Yeonsei University, JONG-CHUL PARK, Chungnam National University, SEODONG SHIN, Jeonbuk National University, UN-KI YANG, Seoul National University, JAEHOON YU, University of Texas at Arlington — Axion-like Particles (ALPs) are viable candidates for dark matter and can interact with the Standard Model photons through the Primakoff scattering. This enables a search for ALPs in a beam dump experiment at a high-intensity beam facility, such as the Rare Isotope Accelerator complex for ON-line experiment (RAON), under construction in Korea. The proposed Dark Matter Searches at Accelerator (DMSA) is an experiment to take advantage of this facility to be in operation shortly in Korea. The main physics goal of DMSA is searching for ALPs and other dark sector particles using 1 m thick iron beam dump and a 610-ton liquid argon time projection chamber (LAr TPC) situated immediate downstream of the dump. The neutrons and neutrinos produced in the proton interactions in the dump are crucial background to search for ALPs which are charge neutral. Therefore, evaluating the effect of these backgrounds is a critical step in designing such experiments. In this presentation, we present our background study based on GEANT4 simulation. We examine the production process of neutrons in the dump, and the impact of the moderators of various materials and thicknesses to determine optimal dimension of the moderator for neutron background mitigation.

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