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High-Gradient Accelerating Structures for 3-GeV Proton Radiography Booster

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Increasing energy of proton beam at the Los Alamos Neutron Science Center (LANSCE) from 800 MeV to 3 GeV will improve radiography resolution ~10 times. This energy boost can be achieved with a compact cost-effective linac based on normal conducting high-gradient (HG) RF accelerating structures. Such an unusual proton booster is feasible for proton radiography (pRad), which operates with short beam pulses at very low duty. The pRad booster starts with a short L-band section to capture and compress the 800-MeV proton beam from the existing linac. The main HG linac is based on S- and C-band cavities. An L-band de-buncher at the booster end reduces the beam energy spread. We present details of development of proton HG structures with distributed RF coupling for the booster. Operating such structures at liquid-nitrogen temperatures will significantly reduce the required peak RF power. A short test structure was fabricated and is being tested at the LANL C-band RF Test Stand.

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