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Comparison of short-lived medical isotopes activation by laser thin target induced protons and conventional cyclotron proton beams JOSEPH MURRAY, GALINA DUDNIKOVA, TUNG-CHANG LIU, DENNIS PAPADOPOULOS, ROALD SAGDEEV, J.J. SU, Dept. of Physics, Univ. of Maryland, UMD MICROPET TEAM — Production diagnostic or therapeutic nuclear medicines are either by nuclear reactors or by ion accelerators. In general, diagnostic nuclear radioisotopes have a very short half-life varying from tens of minutes for PET tracers and few hours for SPECT tracers. Thus supplies of PET and SPECT radiotracers are limited by regional production facilities. For example 18F-fluorodeoxyglucose (FDG) is the most desired tracer for positron emission tomography because its 110 minutes half-life is sufficient long for transport from production facilities to nearby users. From nuclear activation to completing image taking must be done within 4 hours. Decentralized production of diagnostic radioisotopes will be idea to make high specific activity radiotracers available to researches and clinicians. 11C, 13N, 15O and 18F can be produced in the energy range from 10-20 MeV by protons. Protons of energies up to tens of MeV generated by intense laser interacting with hydrogen containing targets have been demonstrated by many groups in the past decade. We use 2D PIC code for proton acceleration, Geant4 Monte Carlo code for nuclei activation to compare the yields and specific activities of short-lived isotopes produced by cyclotron proton beams and laser driven protons.

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