# AbstractID: 7095 Title: A Proposal for a Novel Compact Intensity Modulated Proton Therapy System using a Dielectric Wall Accelerator

Purpose: A novel compact CT-guided intensity modulated proton radiotherapy (IMPT) system is introduced. The system is being designed to deliver motion-managed IMPT to large target volumes. The system will be ideal for large and complex target volumes in young patients.

Method and Materials: The basis of the design is the dielectric wall accelerator (DWA) system being developed at Lawrence Livermore National Laboratory (LLNL). The DWA will use fast switched high voltage transmission lines to generate pulsed electric fields on the inside of a high gradient insulating (HGI) acceleration tube. High electric field gradients are achieved alternating insulators and conductors and short pulse times. The system will produce individual pulses that can be varied in intensity, energy and spot width, all of which will be optimized in the IMPT planning system. It is anticipated that no magnets will be required and the neutron contamination will be very low. The system will be capable of being sited in a conventional linac vault.

Results: The design specifications have been met in some component tests. Gradients of 100 MV/m have been achieved in small HGI samples. Optical switches based on fast laser switched SiC has been achieved. Feasibility tests of an optimization system for selecting the position, energy, intensity and spot size for a collection of spots comprising the treatment are underway. A prototype is being designed and concept designs of the envelope and environmental needs of the unit has commenced.

Conclusion: The DWA accelerator represents breakthrough technology for intensity modulated proton therapy. The system is being designed from the ground up to be capable of CT-guided intensity modulated proton therapy and to be housed in a conventional linac vault.

Conflict of Interest:Some of the authors have financial interest in TomoTherapy Inc., which has licensed the DWA technology from LLNL.