TITLE: Helical Pulseline Structures for Ion Acceleration

LBNL-57130 Abs,
HIFAN 1407a

PRESENTATION TYPE: Poster

CLASSIFICATION: PPHIB-P

AUTHORS: Richard J. Briggs*, Louis L. Reginato, and William L. Waldron

ABSTRACT: The basic concept of the "Pulseline Ion Accelerator" involves launching a ramped high voltage pulse on a broad band traveling wave (slow-wave) structure. An applied voltage pulse at the input end with a segment rising linearly in time becomes a linear voltage ramp in space that propagates down the line, corresponding to a (moving) region of constant axial accelerating electric field. The ions can "surf" on this traveling wave, experiencing a total energy gain that can greatly exceed the peak of the applied voltage. The applied voltage waveform can also be shaped to longitudinally confine the beam against its own space charge forces, and (in the final stage) to impart an inward compression to the beam for neutralized drift compression in heavy ion HEDP applications. In the first stages of a heavy ion accelerator, the pulseline velocity needs to be the order of 1% of the speed of light and the line must be sufficiently non-dispersive for the broad band voltage pulse propagating down the line to have minimal distortion. The current favorite for this slow-wave structure consists of a helical wire, inside a metal tube and embedded in dielectric material. Experimental characterization of the dispersion and pulse propagation at low voltage on several helix models will be presented, and compared with theoretical predictions**.

FOOTNOTES: *SAIC, Alamo, CA.
** Caporaso, et al, "Dispersion Analysis of the Pulseline Accelerator", this conference.

FUNDING AGENCY: This work was performed under the auspices of the U. S. Department of Energy by the University of California, Lawrence Berkeley National Laboratory, Contract DE-AC03-76SF00098