Dan Birx Memorial Session

Richard Briggs, SAIC, Pleasanton, CA, USA

This session was organized as a memorial to Dan Birx, one of the most talented and innovative contributors in the fields of pulse power and linear induction accelerator technology. The accelerator community was shocked and saddened to learn of Dan's untimely death in a private plane crash last March, at age 45 in the midstream of a most productive career. The talks in this special session cover several accelerator-related technical areas that were especially impacted by Dan, and the speakers all had the good fortune of having been one of Dan's coworkers and collaborators.

Dan Birx was a very unusual and special kind of talent rarely found in the community of physicists and engineers, combining deep physics understanding and insight with enormous practical talents. The speed with which he could turn novel ideas into working hardware was truly unprecedented

Dan started his career "pushing the envelope" in high power switching with his Ph.D. thesis exploring novel ways of switching intense microwave pulses out of superconducting cavities. In 1979, Dan joined the Beam Research Program at LLNL and began immediately contributing to the linear induction accelerator technology developments that were underway. George Caporaso reflects the legacies of these contributions in the first talk, WE101, of this session on recent progress in induction linacs.

With his insight into RF and microwaves, Dan was asked to take on the job of suppressing BBU modes in the prototype induction cells for the ATA, a 50MeV, 10KA induction accelerator under construction in the early 80's. The techniques he pioneered, judicious placement of ferrite dampers in the cells, reduced the Q's dramatically. These techniques were recently reapplied with his help on the DARHT-II induction accelerator, as discussed by Bill Fawley in the second talk, WE102, of this session.

In the early 80's the rep rate performance of induction linacs like ATA were limited mainly by the capability of the switching elements in the pulse power drivers. The spark gaps deployed on ATA were limited to burst rates of one kHz for a few pulses, even with enormous gas blowers to purge the gap. Dan began an R&D program on 250KV, 20KA nonlinear magnetic switches to replace these spark gaps, building on earlier ideas of Lou Reginato, his lifelong collaborator. This program

culminated in the MAG-1D magnetic compressor, a truly major advance in pulse power systems for high average power applications. Follow-on applications include the 5-kHz CW MLD-IV modulators developed for the Laser Isotope Separation Program. Ed Cook, a collaborator in these early developments, describes the current frontier of all solid-state modulators that followed from this pioneering work in the third talk of this session.

As very high brightness multi-kiloamp electron beams became important for Free Electron Laser applications, Dan's "skunkworks" at LLNL expanded to include their development as well as the high power modulators to drive them. To install a high average power demonstration unit as cheaply as possible, in typical fashion Dan came up with the innovative approach of lowering the machine into a pool of water to provide the shielding (the SPA, for "swimming pool accelerator").

Dan joined Science Research Labs in 1987, where he continued to develop magnetic pulse compressors and small induction linacs for a broad spectrum of government and commercial applications. He pioneered the integration of solid-state commutators with magnetic pulse compression, and successfully made the bridge to commercial grade devices in areas like eximer laser drivers.