



Contribution ID: 2594 Contribution code: TUPA055

Type: **Poster Presentation**

## A DSRD-Based Pulse Forming Network for a Dielectric Wall Accelerator

*Tuesday, 9 May 2023 16:30 (2 hours)*

**Purpose:** In the effort to develop a compact dielectric wall accelerator (DWA) system for proton radiotherapy, this work aims to demonstrate the feasibility of a drift step recovery diode (DSRD) based pulse forming network (PFN) to generate high magnitude, nanosecond scale voltage pulses at high repetition rates.

**Methods:** An initial numerical feasibility study was conducted in order to demonstrate the possibility of generating a 17 kV, nanosecond scale pulse with a DSRD-based standard PFN (forward and reverse current branch). Then, a DSRD-based PFN was designed using a magnetic switch, seen in Figure 1 (<https://bit.ly/3iMCOHs>). Saturation of a transformer discharges a storage capacitor. At maximum current, the DSRD turns off, commuting stored energy to a load. A low energy prototype was developed at SLAC. A 20 kV, high repetition rate (1-10 kHz) prototype is currently being developed.

**Results:** The numerical study demonstrated that a max output of 16505 V with a rise time of 1.11 ns can be generated with a stack of 19 DSRDs. Figure 2 (<https://bit.ly/3VGPuhS>) presents a 4.9 kV pulse of the low energy prototype.

### Funding Agency

NSERC PGSD3-559436-2021

### Footnotes

### I have read and accept the Privacy Policy Statement

Yes

**Primary author:** BANCHERI, Julien (McGill University)

**Co-authors:** MAHER, Morgan (McGill University); LUND, Christopher (McGill University); KRASNYKH, Anatoly (SLAC National Accelerator Laboratory); SEUNTJENS, Jan (University of Toronto)

**Presenter:** BANCHERI, Julien (McGill University)

**Session Classification:** Tuesday Poster Session

**Track Classification:** MC3: Novel Particle Sources and Acceleration Techniques: MC3.A15: New Acceleration Techniques