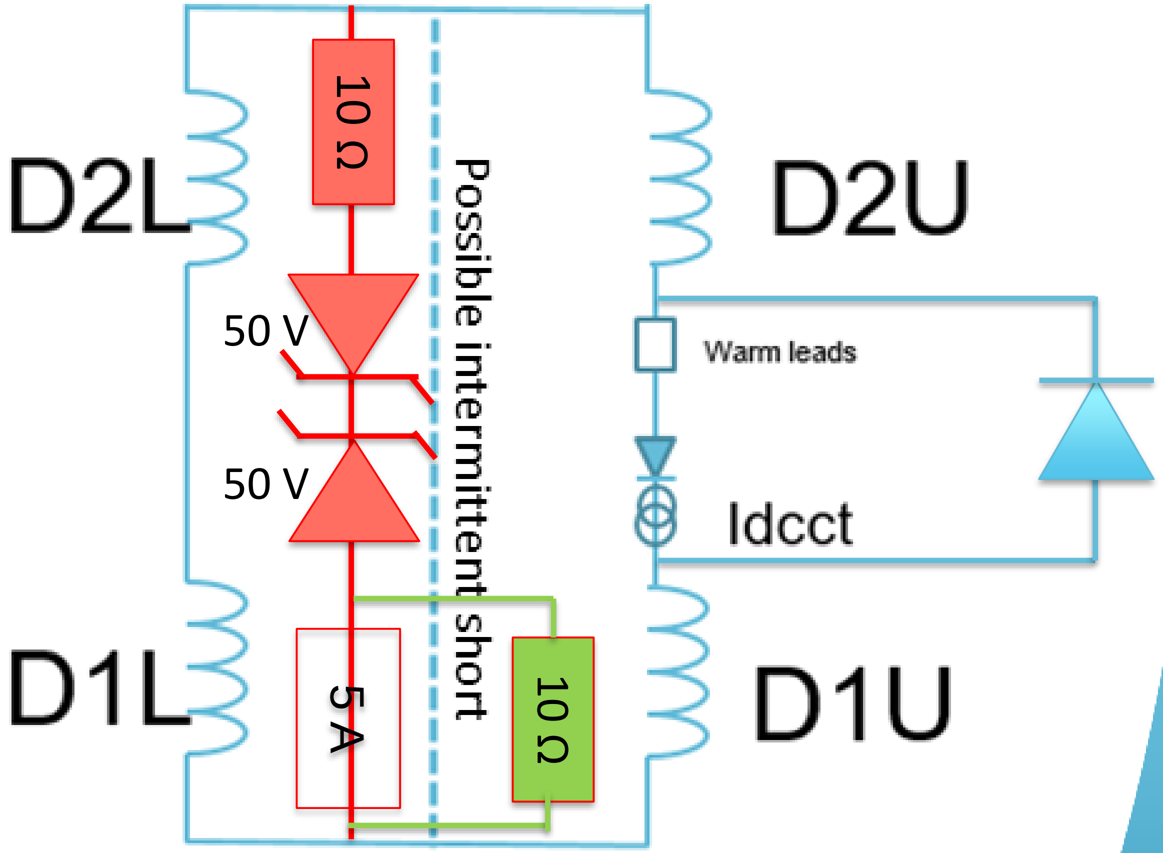
Simulations after installing an artificial short – Configuration 1

Assumption: fuse blows up in 1 µs

- Without R_{par_fuse}, peak voltage across short is ~1.4 kV
- With R_{par_fuse}=100 Ω, peak voltage across short is ~500 V
  - Not sufficient to suppress the voltage
- With R_{par_fuse}=10 Ω, peak voltage across short is ~130 V
  - Sufficient to suppress the voltage
  - Current through R_{par_fuse} before fuse blow-up is <1 µA
  - Amplitude of coil voltage spikes should be reduced from ~5 V to ~1 V
- Note: no current through the parallel path during magnet ramp-up (better for quench detection system)

Final proposed configuration:
50 V Zener Diodes in series to 10 Ω resistor in series to a 5 A fuse, with an additional 10 Ω resistor across the fuse



Simulations after installing an artificial short – Configuration 2

Assumption: fuse blows up in 1 μs

- Without R_{par_path}, peak voltage across short is ~1.4 kV
- With R_{par_path}=1 kΩ, peak voltage across short is ~1.1 kV
  - Not sufficient to suppress the voltage
- With R_{par_path}=100 Ω, peak voltage across short is ~450 V
  - Not sufficient to suppress the voltage
- With R_{par_path}=10 Ω, peak voltage across short is ~130 V
  - Sufficient to suppress the voltage
  - But current through R_{par_path} even before fuse blow-up is ~9 A
  - During magnet ramp-up, ~0.5 A through R_{par_path}

Previous configuration with the 10 Ω resistor across the fuse seems better because the additional resistor only influences the transient in case of fuse blow-up