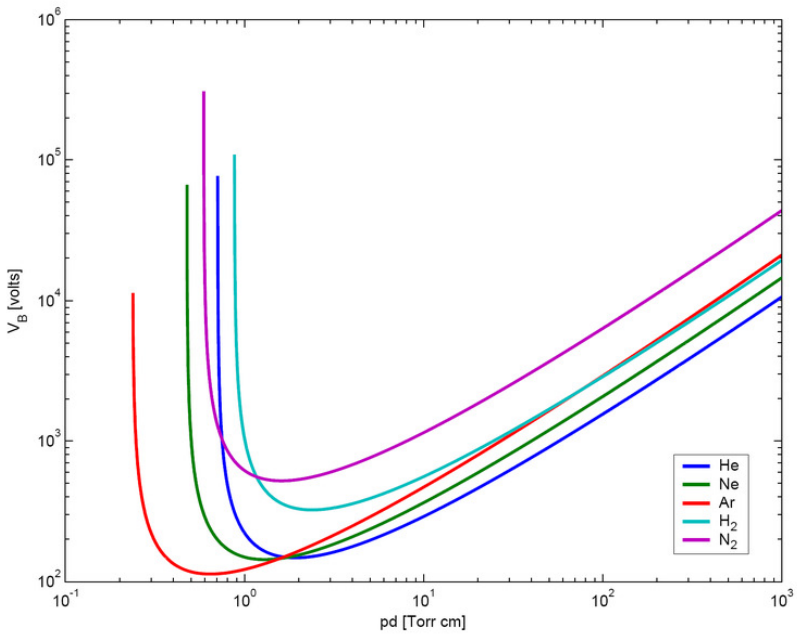
we know desired voltage, solve for pd:

$V_x := 20000$

$$pd_x := \left(\frac{V_x}{V_0}\right)^{m_p^{-1}} \cdot pd_0 \cdot torr \cdot cm \qquad pd_x = 1522\,torr \cdot cm$$

compare with argon at 20 kV : from: http://en.wikipedia.org/wiki/Paschen'slaw



$pd_{x\_Ar} := 1000 \cdot torr \cdot cm$ @20kV

ratio, Xe to argon breakdown strength

$$R_{bd} := \frac{pd_{x\_Ar}}{pd_x} \qquad R_{bd} = 0.657$$

pressure ratio: $R_{pr} := \frac{16.5bar}{1bar}$ $R_{pr} = 16.5$ $240psi = 1.655 \times 10^6\,Pa$

Combined ratio, we scale voltage down for lower pressure, but up for stronger gas:

$$R_{tot} := R_{pr} \cdot R_{bd} \qquad R_{tot} = 10.839$$

Final voltages:

$$V_{cath} := \frac{-20kV}{R_{tot}} \qquad V_{cath} = -1845\,V$$

$$V_{EL\_anode} := \frac{20kV}{R_{tot}} \qquad V_{EL\_anode} = 1845\,V$$

$$V_{EL\_cathode} := \frac{9kV}{R_{tot}} \qquad V_{EL\_cathode} = 830\,V$$

$V_{EL\_anode} - V_{EL\_cathode} = 1.015 \times 10^{3}\,V$

$b := 20lbf$

$M := a \cdot$ ▮

$M =$ ▮ $in \cdot lbf$