

# Ion chamber notes for APS staff

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The purpose of this document is to help people with setting up an ion chamber.

The ion chamber is biased by a negative high voltage source like the PS 350 from Stanford Research system through a SHV connector. With very high monochromatic flux on 7-ID like  $10^{13}$  ph/s, we ran it sometimes just under 5 kV. When used in air, note that the signal is pressure dependent so it will fluctuate with atmospheric pressure. It may also be affected by humidity.

For pink beam, one can use He to reduce the current but this would add windows so it's not particularly good for SAXS. In He, one needs to operate the ion chamber at much smaller voltages, under about 700 V. This is something one can test but raising the voltage slowly to see when the He breaks down with an arc. We used this trick at Brookhaven in an Helium enclosure to determine how good the He environment was.

The current preamplifier SR570 used has an output limit about 6.5 V. When the voltage is going through a Nova V to F at 100,000 counts per volts, the maximum count rate should not exceed 600,000 per second, on the signal may be saturated. One would change the gain of the preamplifier to reduce the output count rate.

Also one must make sure that the output voltage from the SR570 is positive such that the background without x-rays remains above a few hundred cts/s to account for the small negative dark current (V/F only works with positive numbers input voltages). This is done by adding a small bias to the input gain, either polarity, whatever works. When the voltage is negative, the count rate will be 1 ct/s, but one has no idea how low the voltage is so it may result in another source of nonlinearity.