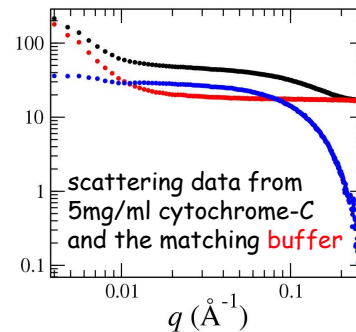
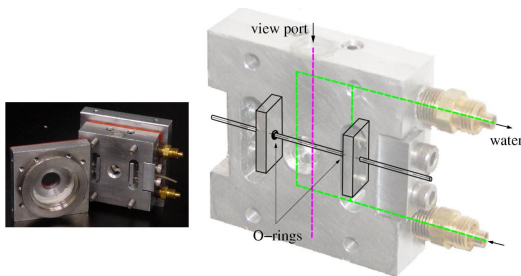
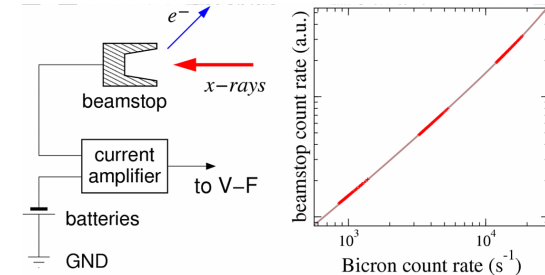


# X-ray scattering instrumentation at X21

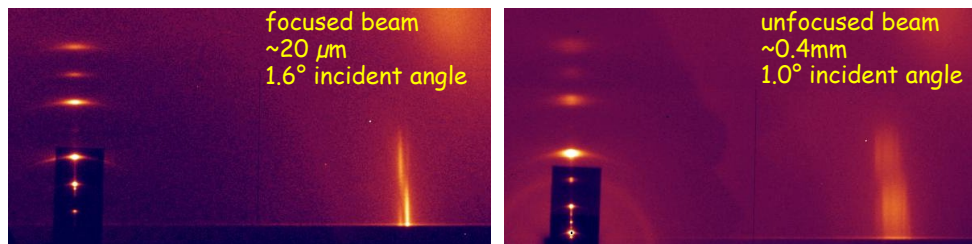
**Motivation:** Well designed instrumentation is a key element to successful X-ray scattering measurements. This paper describes several aspects of the instrumentation developed at the X-ray scattering station of beamline X21.



**Key result 1:** A scattering-background sample cell has been developed for protein solution scattering measurements. It consists of a glass capillary sealed across the vacuum beam path by O-rings. The glass capillary itself (~10 microns thick) is also the vacuum window and the only material other than the sample that is illuminated by the beam.



**Key result 2:** A beamstop that utilizes photo emission from the metallic beamstop induced by incident X-rays to monitor beam intensity has been constructed and calibrated against a Bircron detector.



lipid chain packing peak, sample size = 2cm

**Key result 3:** A microfocusing mirror was used to focus the X-ray beam in the vertical direction. The smaller beamsizes reduce the footprint of the beam on the sample in grazing incident measurements, therefore improving the angular resolution at wide scattering angles. This can be illustrated by the lipid chain packing peak data later collected. This mirror has also been used to bend the beam downward in experiments at air-liquid interfaces.

**Significance:** The instrumentation described in this paper is the foundation of the experiments supported by X21. It also provided the basic concept for the design of X9 beamline a few years later.

*The X21 SAXS Instrument at NSLS for Studying Macromolecular Systems* L. Yang MACROMOLECULAR RESEARCH, 2005