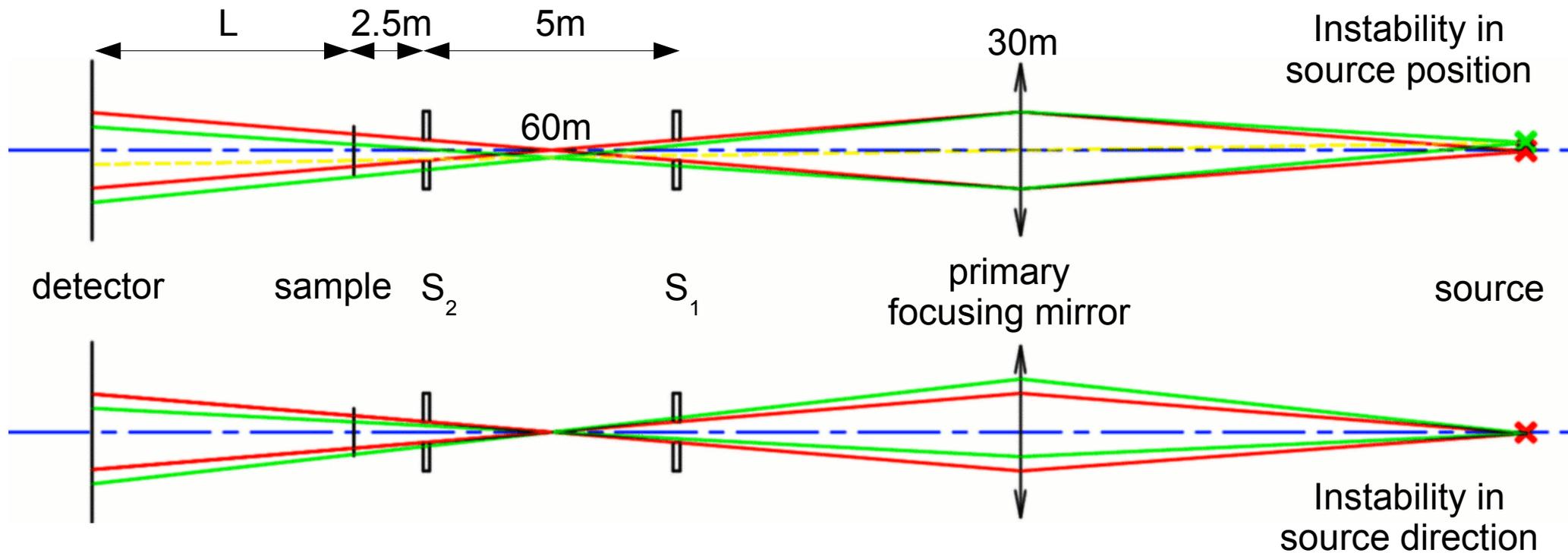


# SAXS beamline stability requirement

	Bulk sample	Microbeam (a few micron)	ASAXS
Intensity	1%		
beam position on the detector	< 1 detector pixel (~0.1mm)		
beam position on the sample	—	10% of beam size	—
X-ray energy	—		same as PX-MAD

source size: 40 $\mu$ m x 4 $\mu$ m, divergence: 20 $\mu$ rad x 10 $\mu$ rad (10keV, U19)  
instability expect to be 10%

# SAXS/USAXS on bulk samples



most challenging configuration:  $S=0.1\text{mm}$ ,  $L=20\text{m}$

assume Gaussian beam shape,  $0.5\mu\text{rad}$  mirror slope error

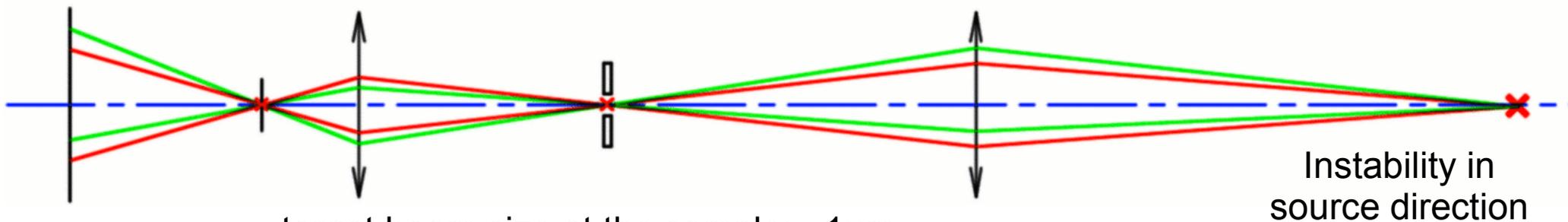
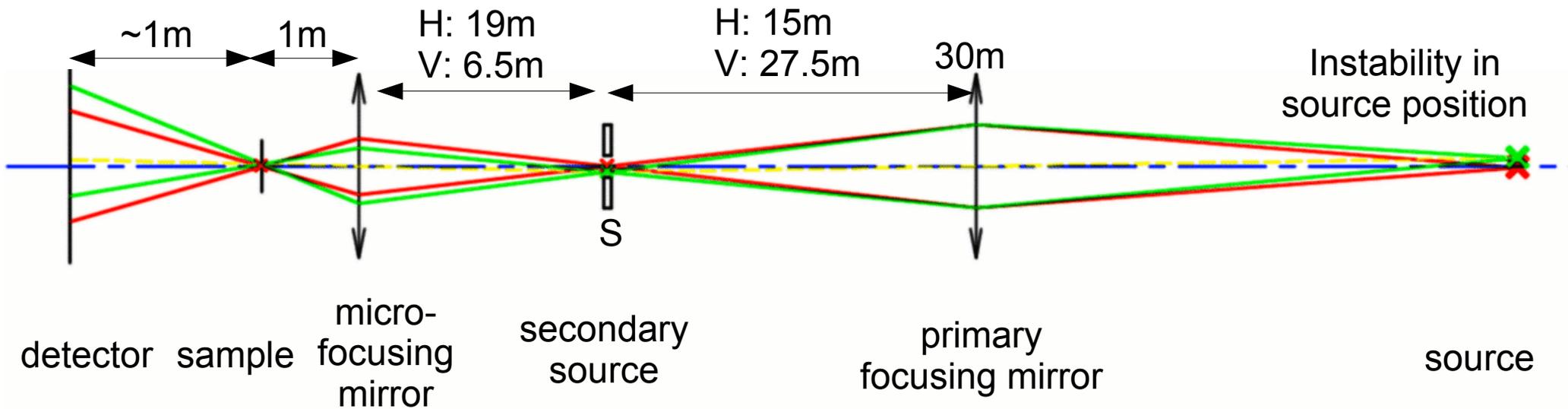
beam size at  $S_1$ :  $\sim 95\mu\text{m}$  (H) x  $42\mu\text{m}$  (V)

beam position uncertainty at  $S_1$ :  $<5\mu\text{m}$  (H, direction) or  $<2.5\mu\text{m}$  (V, direction)

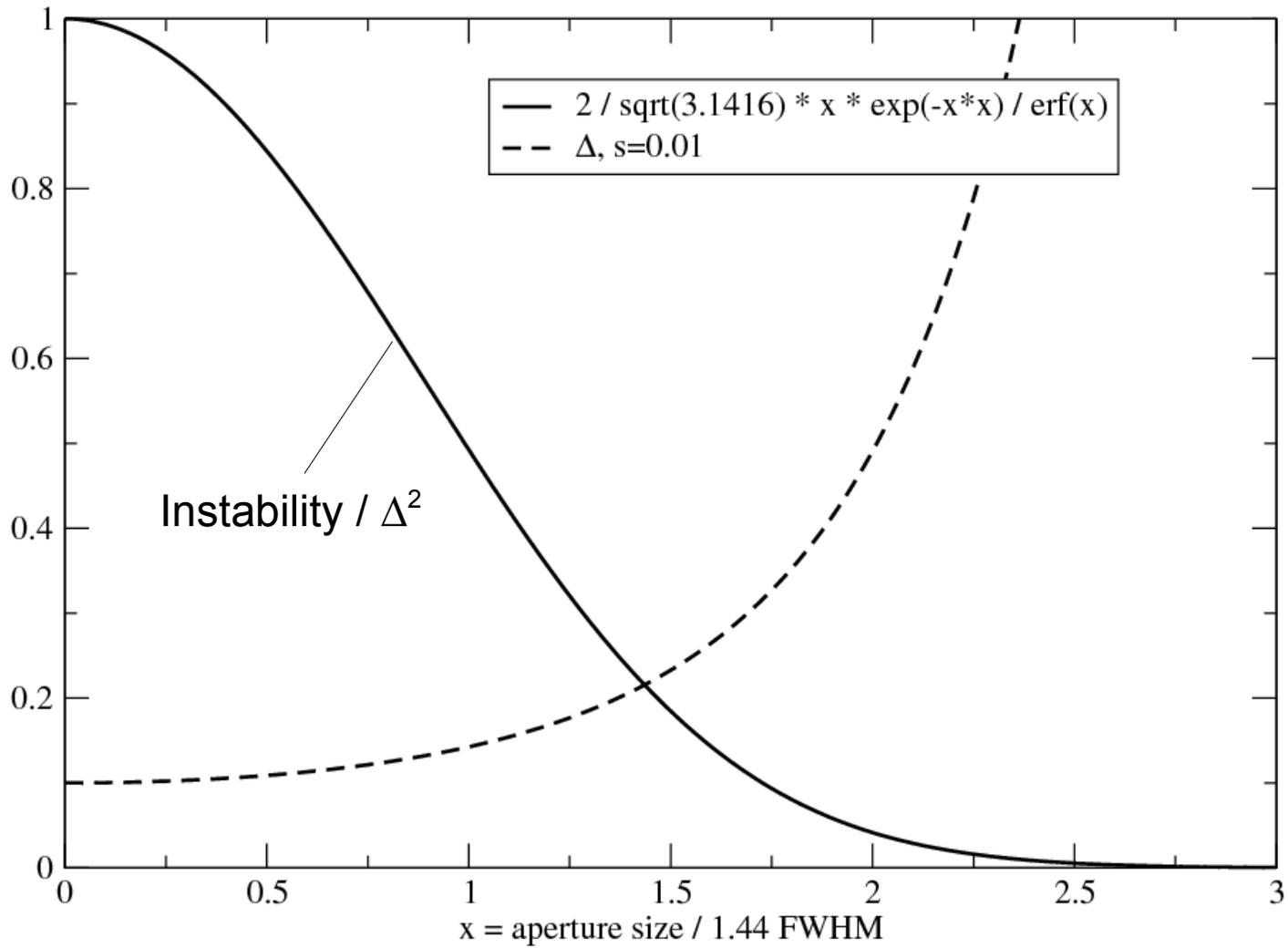
$<1\%$  intensity instability

beam position uncertainty at detector:  $<50\mu\text{m}$  (H, direction)

# Micro-beam SAXS



target beam size at the sample:  $\sim 1\mu\text{m}$   
 secondary source size:  $\sim 25\mu\text{m}$  (H) x  $28\mu\text{m}$  (V)  
 combined demagnification:  $\sim 40:1$  (H) and  $\sim 7:1$  (V)  
 S =  $19\mu\text{m}$  (H) x  $6.5\mu\text{m}$  (V)  
 beam position uncertainty at S:  $< 2\mu\text{m}$  (H) 1.8% intensity instability  
 beam position uncertainty at sample: defined by stability of S  
 beam position uncertainty at detector:  $< 80\mu\text{m}$  (H, direction)



$$\Delta = \frac{\delta}{\sqrt{2}\sigma} = \frac{\delta}{FWHM} \times 2\sqrt{\ln 2} = 1.665 \times \frac{\delta}{FWHM}$$

s is intensity instability,  $\delta$  is beam offset