1   Loki chopper simulations

Chopper position and opening window taken from figure 1, rotation frequency 14 Hz (mode 1) and 7 Hz (mode 2), disc radius 35 cm.
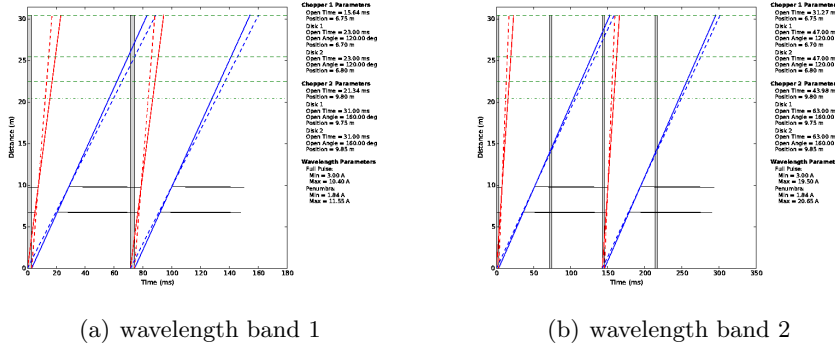

(a) wavelength band 1   (b) wavelength band 2

Figure 1: Chopper parameters baseline

Waveband selection and window shape: The window offset (Vitess input parameter, in deg) has been calculated from the neutron flight path: $t_{disk1,open} = 0.25278 \cdot L \cdot \lambda_{min}$ and $t_{disk2,close} = 0.25278 \cdot L \cdot \lambda_{max} + 2.857$ (t in [ms], l in [m] and λ in [Å]).

Figure 2 (a) shows the transmitted waveband divided by the incoming waveband for the first chopper pair. The horizontal spatial offset caused by the bender has to be taken into account in the calculation of the closing time of the second disk. The guide width on the other hand has no significant effect on the transmission. Table 3 summarizes the calculated chopper parameters used in the Vitess simulation.
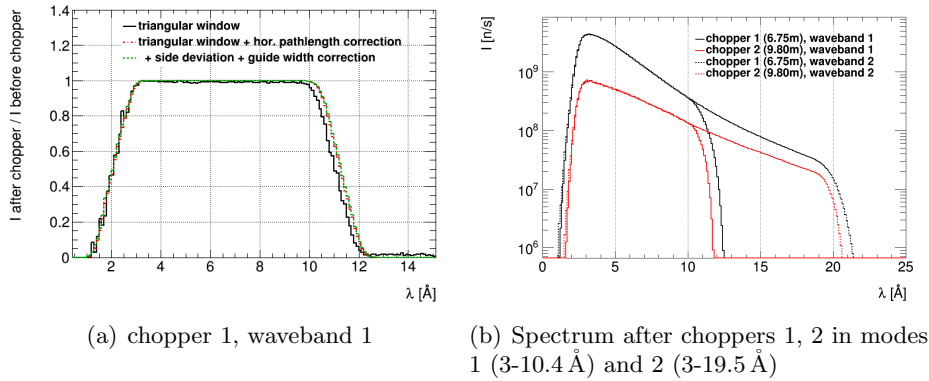

(a) chopper 1, waveband 1   (b) Spectrum after choppers 1, 2 in modes 1 (3-10.4 Å) and 2 (3-19.5 Å)

Figure 2: Waveband selection (only one source pulse simulated)

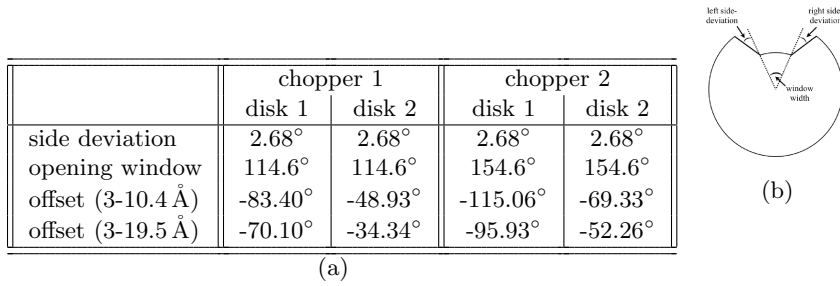|	chopper 1		chopper 2	
	disk 1	disk 2	disk 1	disk 2
side deviation	2.68°	2.68°	2.68°	2.68°
opening window	114.6°	114.6°	154.6°	154.6°
offset (3-10.4 Å)	-83.40°	-48.93°	-115.06°	-69.33°
offset (3-19.5 Å)	-70.10°	-34.34°	-95.93°	-52.26°

(a)

(b)

Figure 3: Calculated chopper parameters. Angular offsets include the horizontal path length corrections and the opening windows include the guide width correction.

Frame overlap: Figure 4 shows that unwanted wavelengths can pass the chopper configuration: in mode 1 (3-10.4 Å), unwanted long wavelengths arrive at the sample position with a delay of seven source pulses, but the contamination is only at the order of 10^{-10}-10^{-9}. In mode 2 (3-19.5 Å), there is a contamination of 10^{-5} of large wavelength neutrons from three (used) pulses before (6 source pulses).

(a) wavelength spectrum

(b) time-of-flight, mode 1
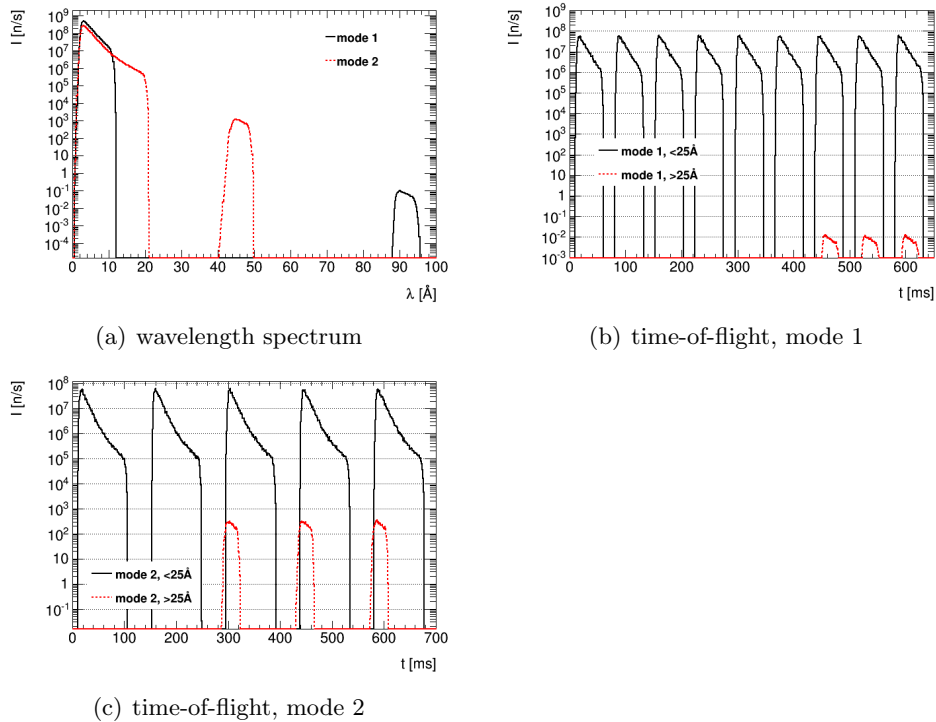

(c) time-of-flight, mode 2

Figure 4: Frame overlap at sample position: wavelength and time-of-flight spectra