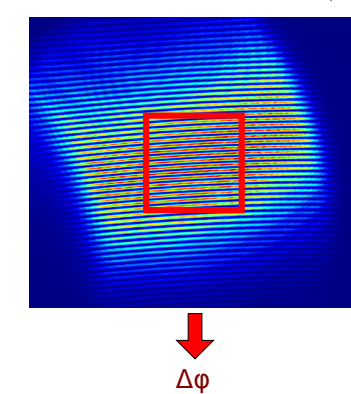
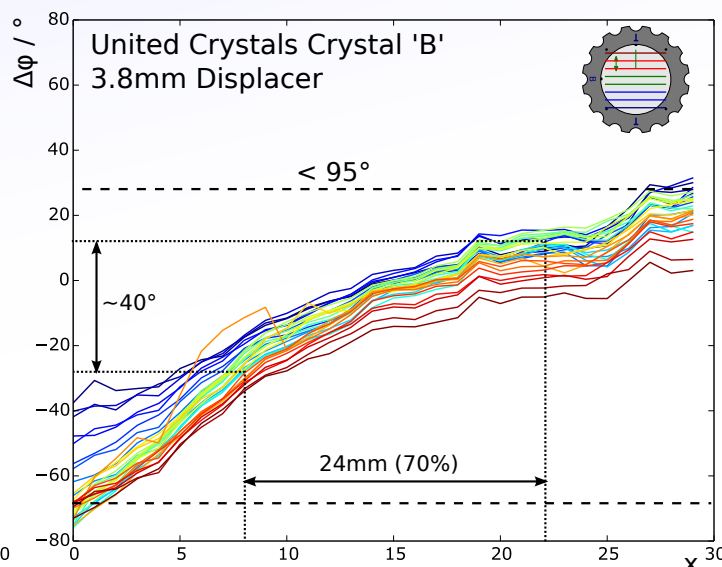
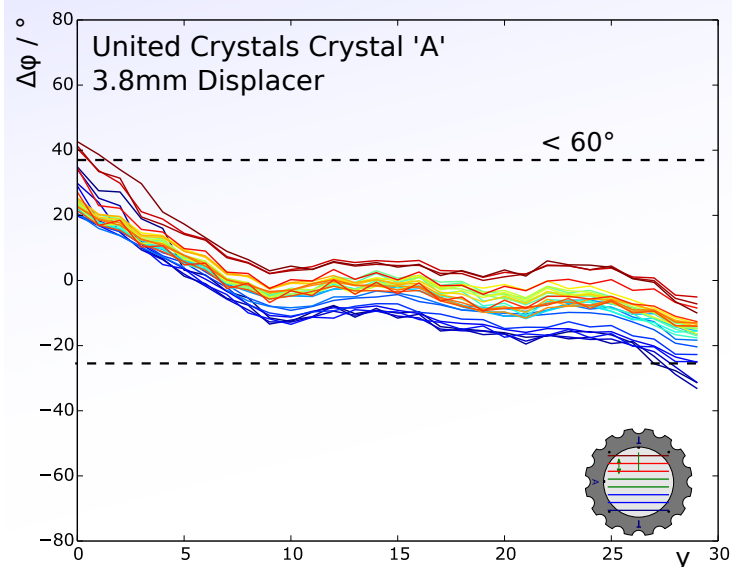
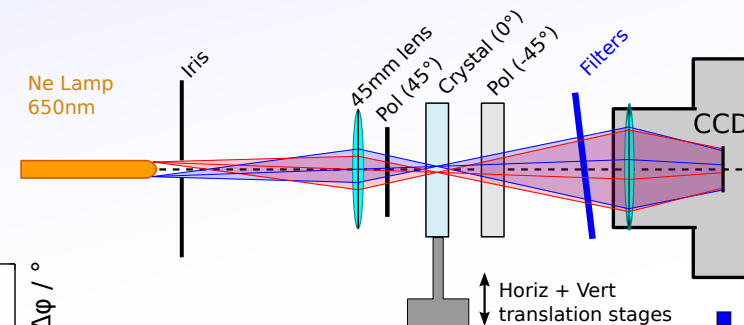
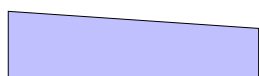


# Birefringence change over surface.

We measure the birefringent phase difference between ordinary and extraordinary components over a  $\sim 2\text{mm}$  area scanned across the surface of the crystal. Measurements are very reproducible. Delay plates ( $90^\circ$  cut) are measured with a fixed displacer after the first polariser. Displacer plates ( $45^\circ$  cut) are measured alone.



We are not entirely sure what property of the plate causes this. Primary suspects:



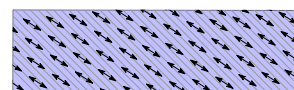
Parallelism

Specs from United Crystals say " $\pm 6$  arcsecs within 70% area". 70% of 35mm is 24mm or would be 29mm for 70% of the 'area' ( $1225\text{mm}^2$ ). 6 arcsecs over 24mm would give a  $0.7\mu\text{m}$  thickness difference.

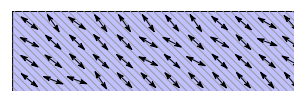
$\Delta\phi = 360 \text{ (no - ne)} \Delta L / \lambda = 45^\circ$   
Plate A is better than this, plate B is almost this bad.

## Optic axis Angle:

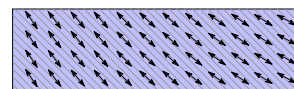
Not specified by United Crystals, but typically  $\pm 0.25^\circ$  elsewhere. What does this mean? I can think of:



a) Crystal cut not aligned with optic axis, but axis is homogeneous: **No problem at all.**



Axis angle varies over small scales randomly but average remains constant: **Not a serious problem.**



Slow variation of axis angle across plate surface: **Really bad - gives surface dependent phase.**  $0.2^\circ$  change would give  $2000^\circ$  of phase variation!