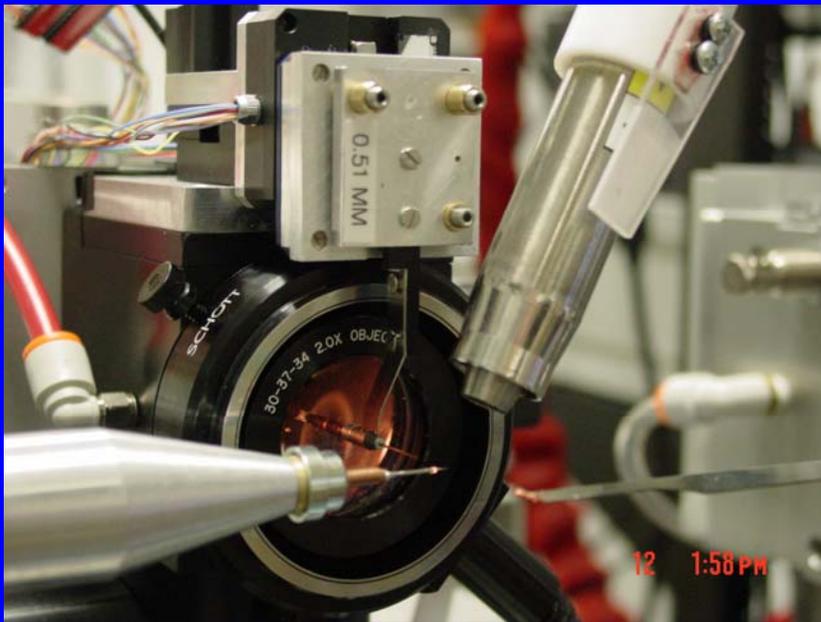
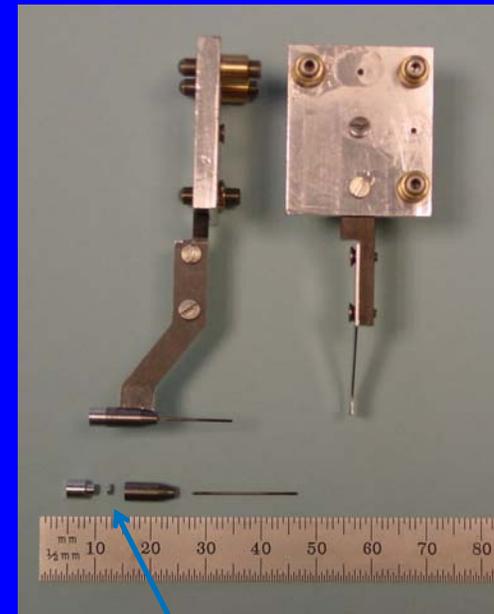


Mini-beam apparatus: small beam-defining pinholes

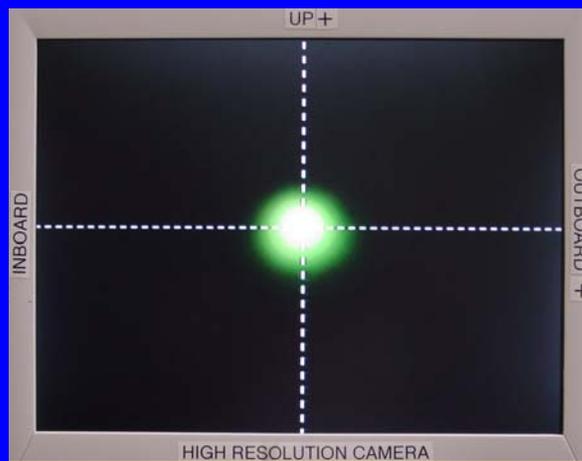


Kinematic mount

- rapidly interchangeability
- 15 minute re-alignment



5, 10, 30 μm apertures



$\sim 7 \mu\text{m}$ beam (FWHM)

Viewed on YAG crystal at sample position

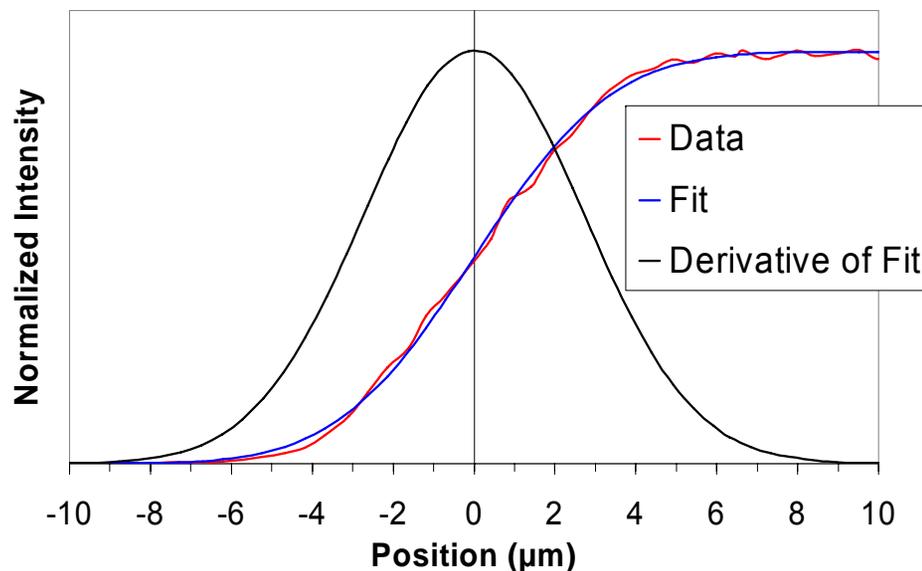
Beam focused at sample position

10 μm aperture

Knife Edge Scans of “Mini-beam” through 10 μm pinhole

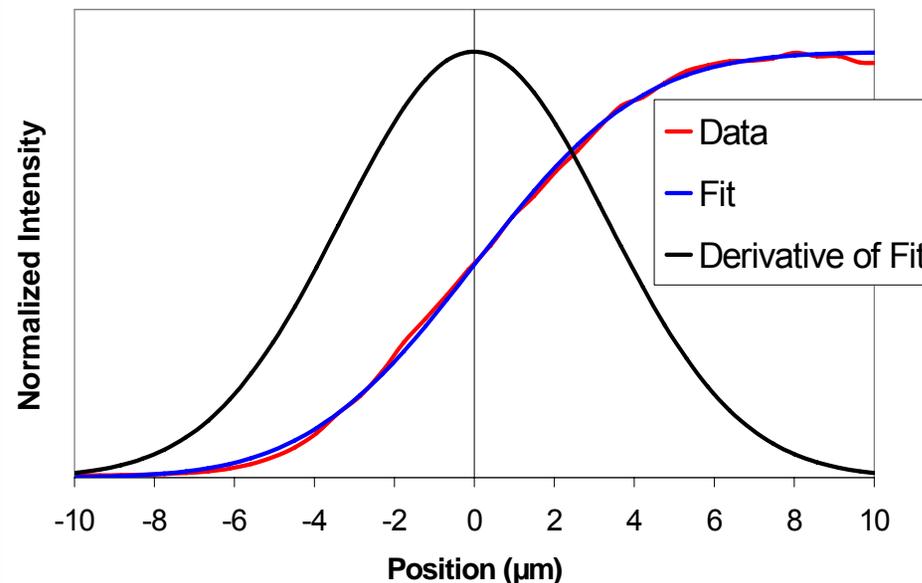
FWHM = 6.3 μm

Vertical Beam Profile



FWHM = 7.8 μm

Horizontal Beam Profile



- Intensity : $\sim 1 \times 10^{11}$ photons/sec/100 mA
- Intensity stability – $< 1\%$ RMS fluctuation
- Beam convergence at sample position
 - Full beam vertical – 133 μrad
 - Mini-beam (10 μm) vertical – 86 μrad
 - Bigger difference in horizontal direction

2

Visualization of small crystals

7 x 7 x 15 μm^3 lysozyme crystal in 30 μm MiTeGen loop

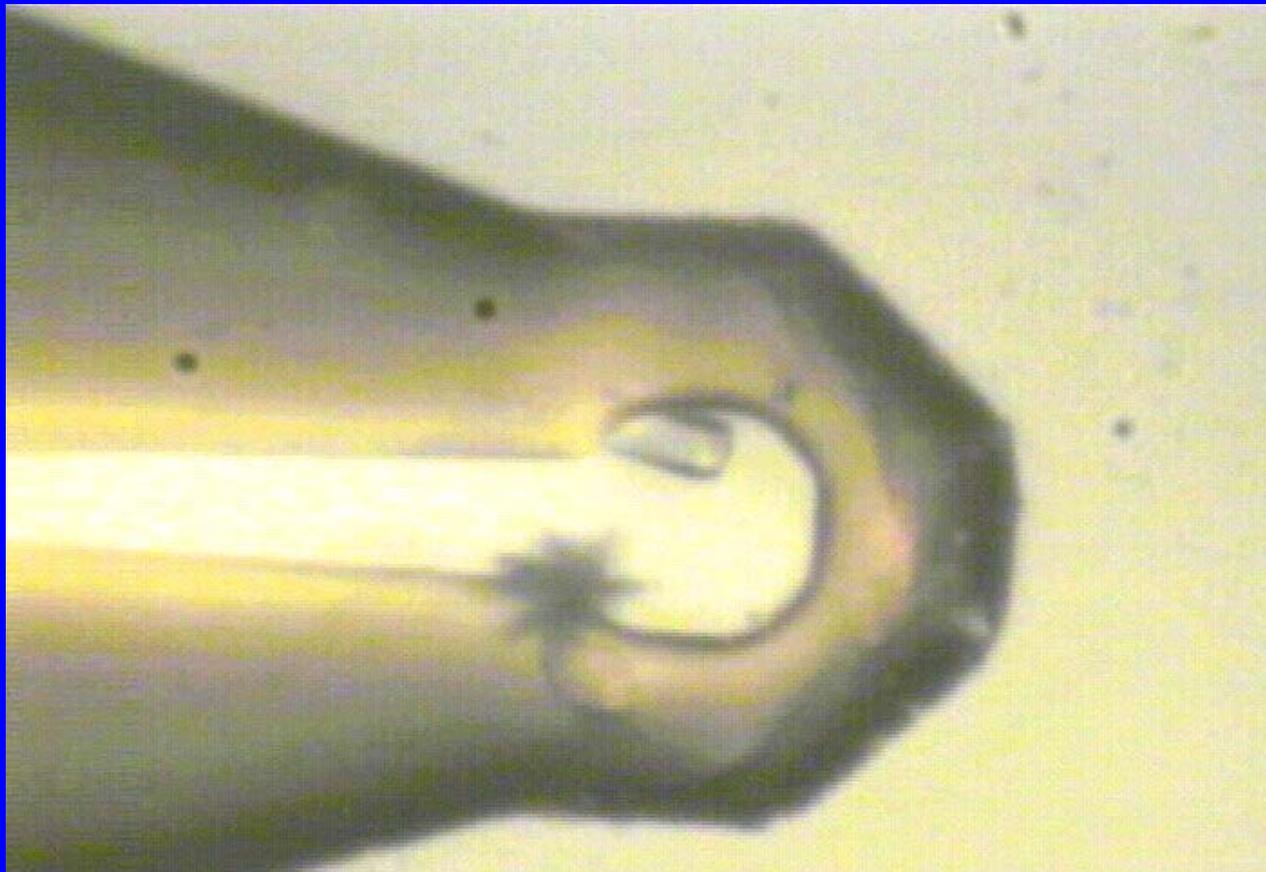
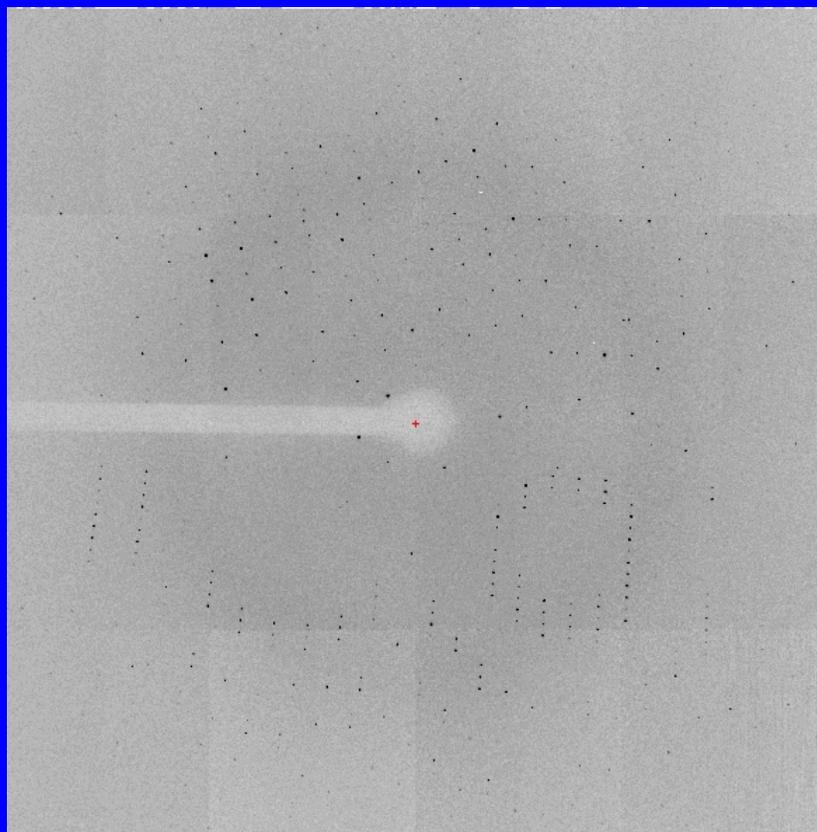


Image recorded with mini-beam apparatus in position

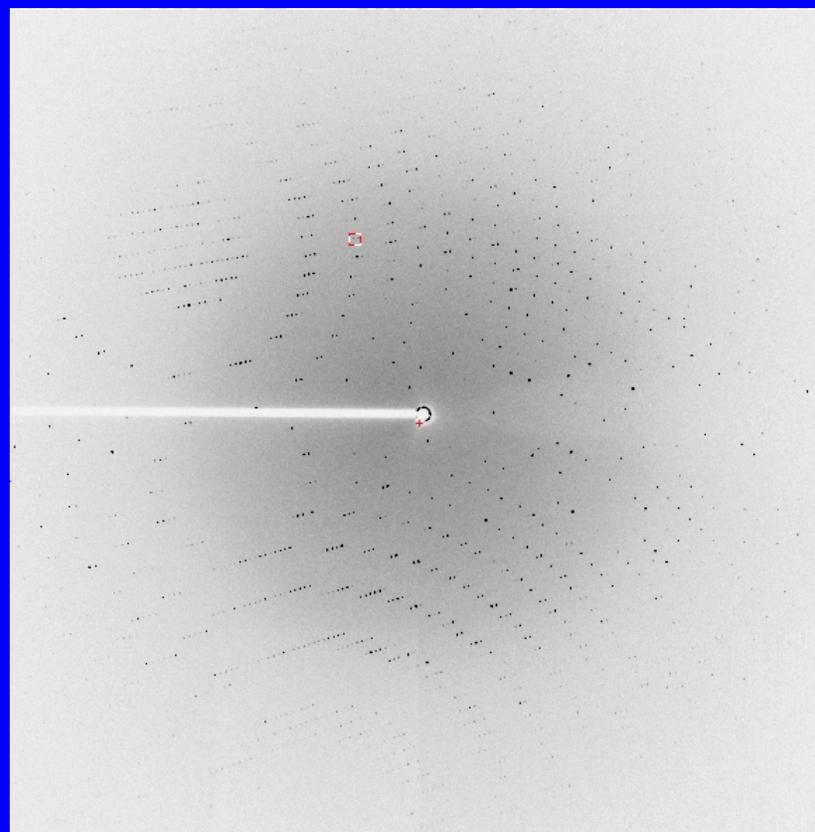
3

Diffraction patterns from small test crystals

7x7x15 μm^3 lysozyme crystal



10x4x<4 μm^3 thaumatin crystal

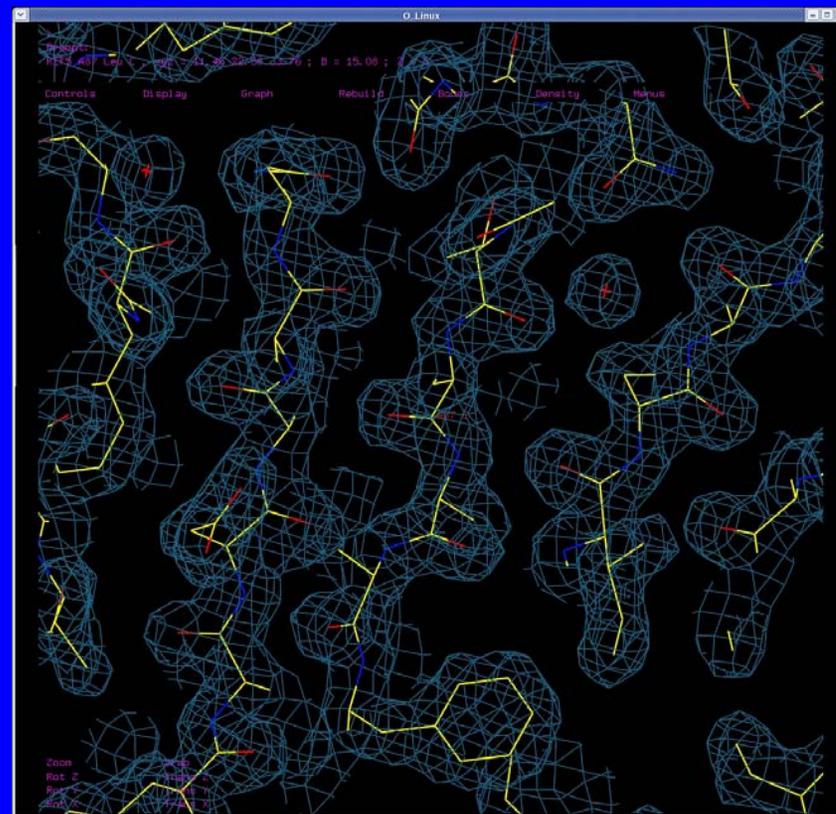
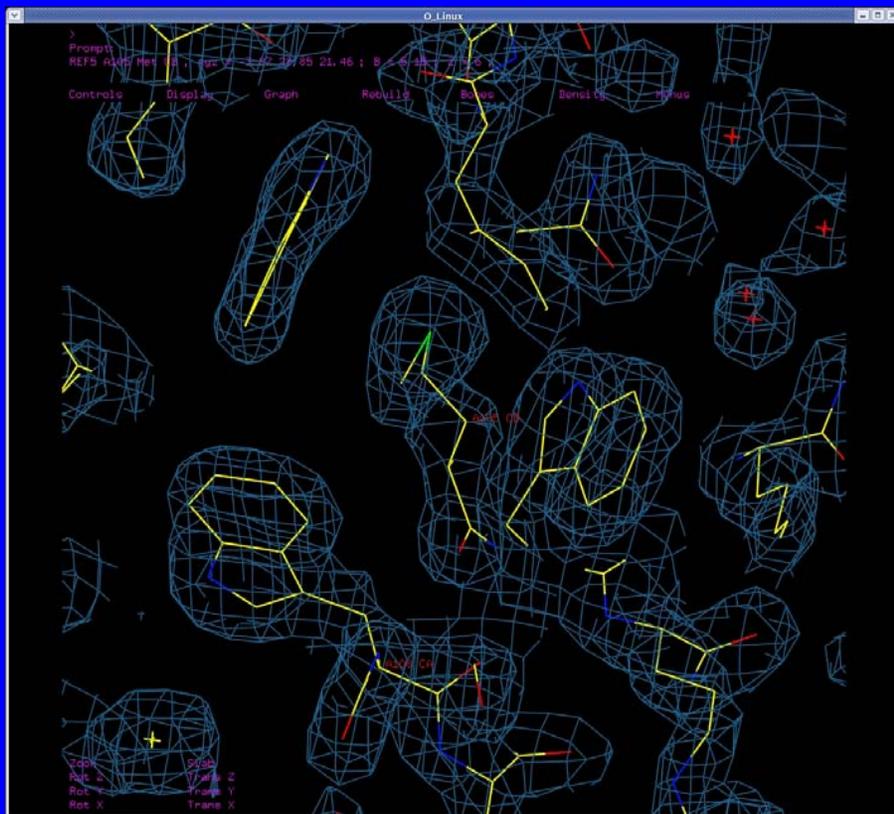


Diffraction from small crystals is weak, but measurable.

Maps after refinement against data from micro-crystals

Lysozyme electron density
Model refined against 2.25 Å data
from 1 small crystal.

Thaumatin electron density
Model refined against 1.94 Å data
from 6 small crystals.

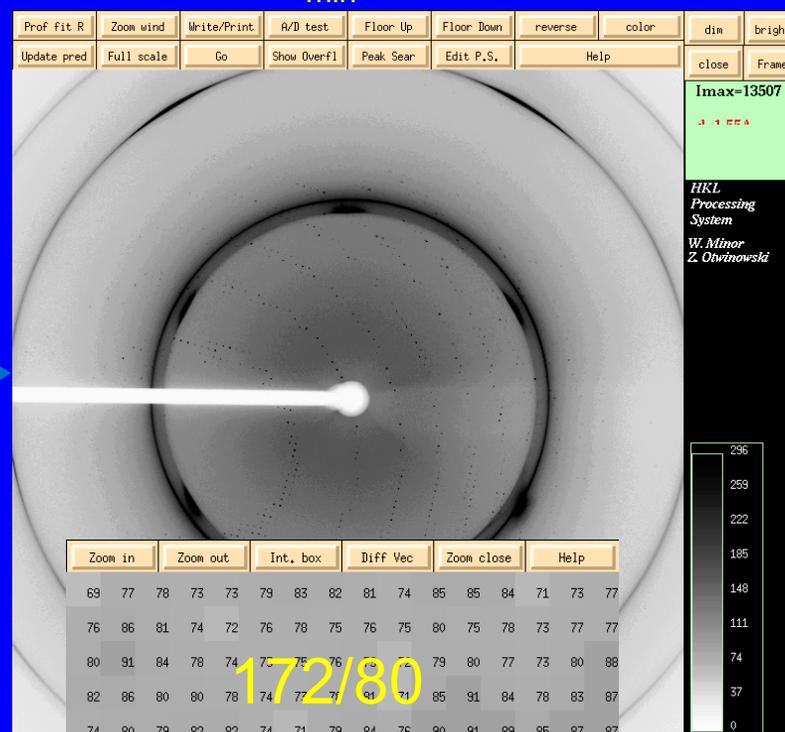
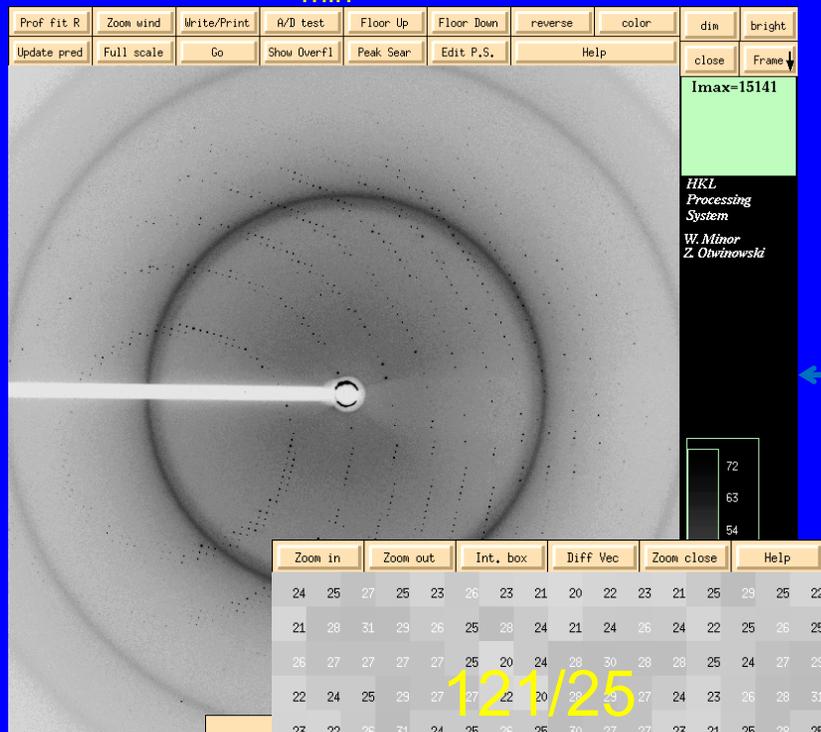


$2F_o - F_c$ electron densities contoured at 1 r.m.s.d.

Improved Signal/Noise from Thioesterase Sample - $\sim 8 \times 8 \times 150 \mu\text{m}$

7- μm beam
 $d_{\text{min}} = 2.4 \text{ \AA}$

75- μm beam
 $d_{\text{min}} = 2.6 \text{ \AA}$



Same
 crystal &
 setting

Same
 reflection

Zoom in	Zoom out	Int. box	Diff Vec	Zoom close	Help										
24	25	27	25	23	26	23	21	20	22	23	21	25	29	25	22
21	28	31	29	26	25	28	24	21	24	26	24	22	25	26	25
26	27	27	27	27	25	20	24	28	30	28	28	25	24	27	29
22	24	25	29	27	27	22	20	29	49	27	24	23	26	28	31
23	22	26	31	24	25	26	25	30	27	27	23	21	25	28	25
26	24	30	35	31	33	28	29	26	26	25	23	23	27	28	24
25	22	28	34	32	31	34	42	43	35	29	25	22	24	25	21
22	21	25	28	28	35	49	79	93	78	52	36	26	23	24	27
20	20	25	27	27	33	48	85	120	113	69	42	30	24	25	28
22	23	28	31	30	30	39	69	109	121	73	41	32	27	25	25
25	27	29	30	29	29	31	50	78	101	62	37	28	25	23	22
25	26	26	25	26	29	25	34	43	65	42	35	27	22	22	22
20	22	22	22	26	29	24	25	31	34	28	32	29	25	24	25
25	25	26	26	24	26	29	24	24	25	25	25	23	22	25	27
24	20	20	25	30	30	26	24	23	25	30	25	24	24	22	22
26	24	23	28	29	29	26	27	25	19	22	22	21	25	25	23

Zoom in	Zoom out	Int. box	Diff Vec	Zoom close	Help										
69	77	78	73	73	79	83	82	81	74	85	85	84	71	73	77
76	86	81	74	72	76	78	75	76	75	80	75	78	73	77	77
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82	86	80	80	78	74	77	77	77	77	85	91	84	78	83	87
74	80	79	82	82	74	71	79	84	76	90	91	89	85	87	87
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73	78	80	77	84	91	103	126	135	116	101	97	98	92	83	80
72	83	81	76	78	91	116	148	163	138	115	101	94	86	80	89
76	85	79	78	81	88	121	167	169	136	114	101	86	86	75	84
79	77	78	82	78	81	115	161	172	143	111	84	84	74	71	71
82	83	76	70	77	93	122	156	160	132	102	83	76	74	76	78
78	78	76	75	75	80	94	106	98	106	98	86	65	74	81	87
86	73	71	70	75	84	89	88	84	77	89	84	78	76	82	83
95	71	71	74	75	82	86	82	87	83	77	76	76	87	83	74
85	72	68	75	79	80	82	81	79	83	77	76	74	80	74	88
77	80	70	75	79	80	80	78	76	81	77	71	70	71	75	74