Supplementary Figures

3D Particle Tracking via Bifocal Imaging

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Fig.S1

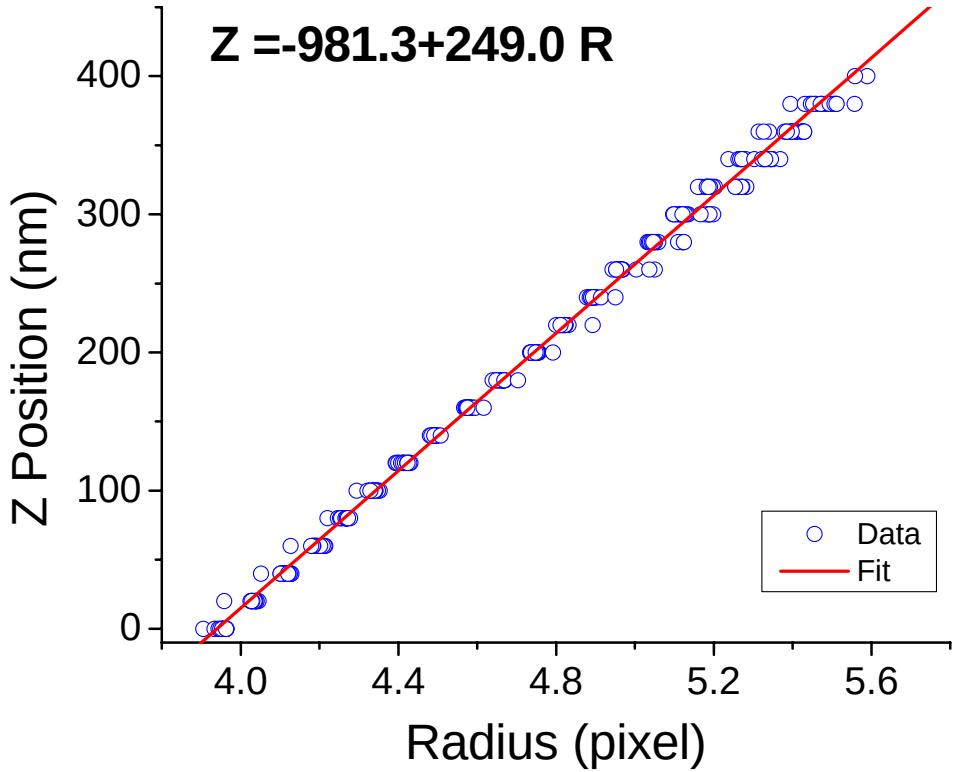
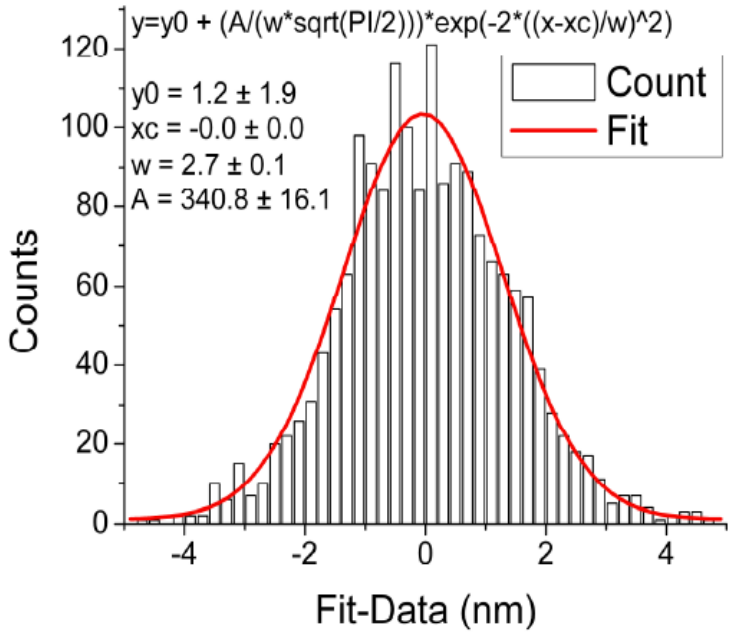

Z =-981.3+249.0 R
Z Position (nm)
0
100
200
300
400
4.0
4.4
4.8
5.2
5.6
Radius (pixel)
Data
Fit

Fig.S2

a


y=y0 + (A/(w*sqrt(PI/2)))*exp(-2*((x-xc)/w)^2)
y0 = 1.2 ± 1.9
xc = -0.0 ± 0.0
w = 2.7 ± 0.1
A = 340.8 ± 16.1
Count
Fit
Counts
Fit-Data (nm)

b

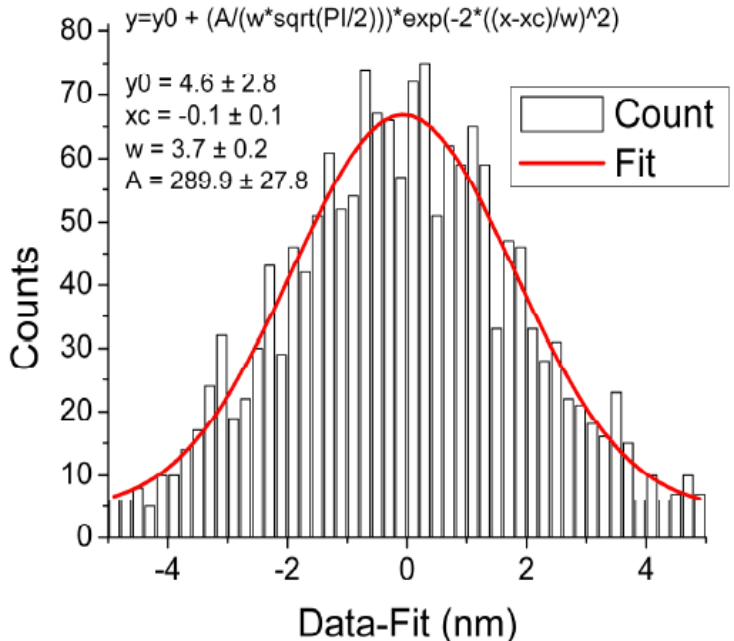

y=y0 + (A/(w*sqrt(PI/2)))*exp(-2*((x-xc)/w)^2)
y0 = 4.6 ± 2.8
xc = -0.1 ± 0.1
w = 3.7 ± 0.2
A = 289.9 ± 27.8
Count
Fit
Counts
Data-Fit (nm)

Fig.S3

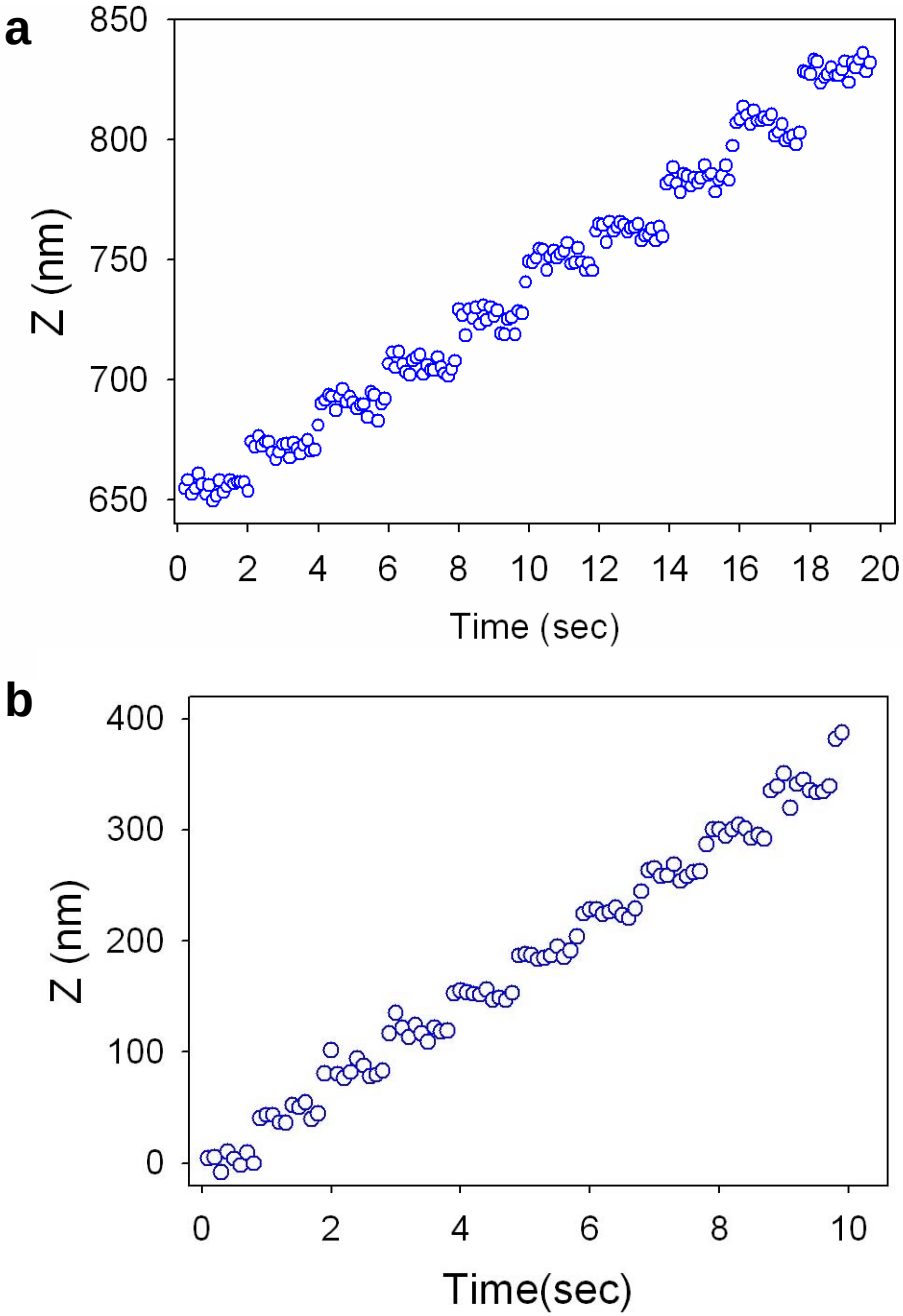
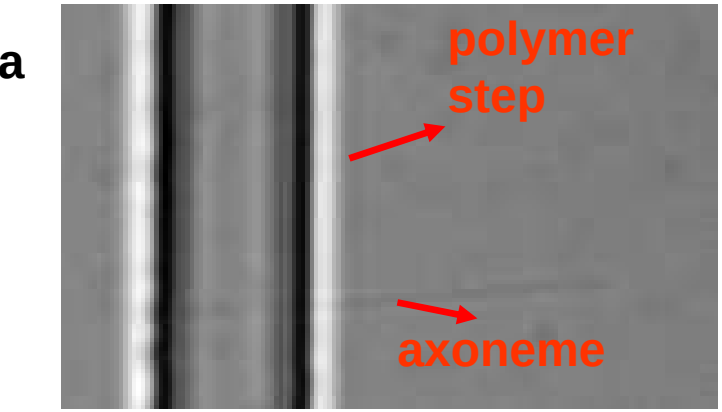
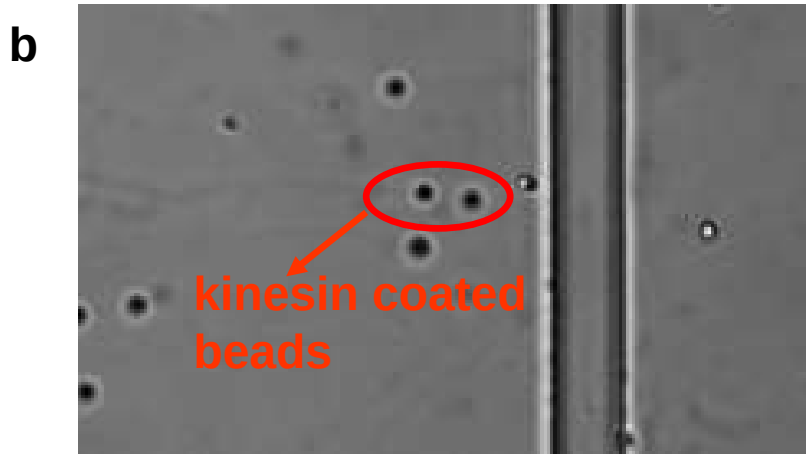
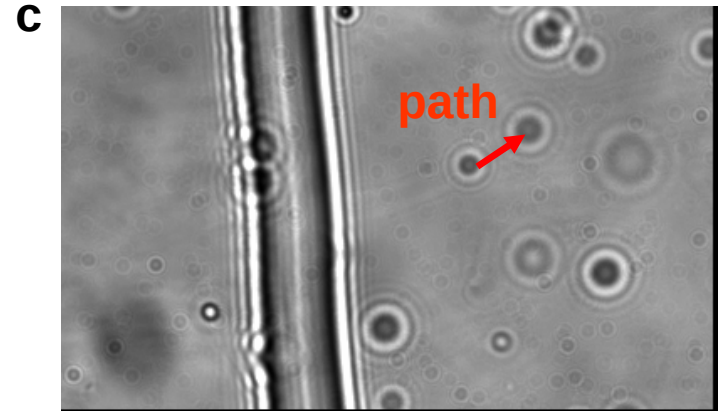
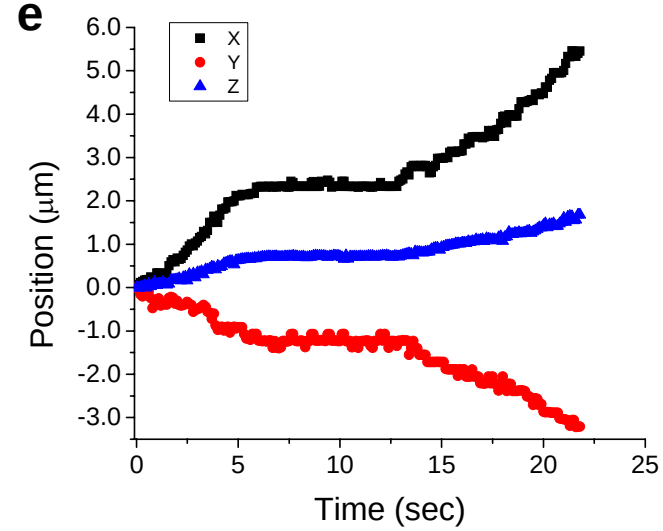

a
850
800
750
700
650
Z (nm)
0
2
4
6
8
10
12
14
16
18
20
Time (sec)
b
400
300
200
100
0
Z (nm)
0
2
4
6
8
10
Time(sec)

Fig.S4


a
polymer step
axoneme


b
kinesin coated beads


c
path


e
X
Y
Z
Position (μm)
Time (sec)

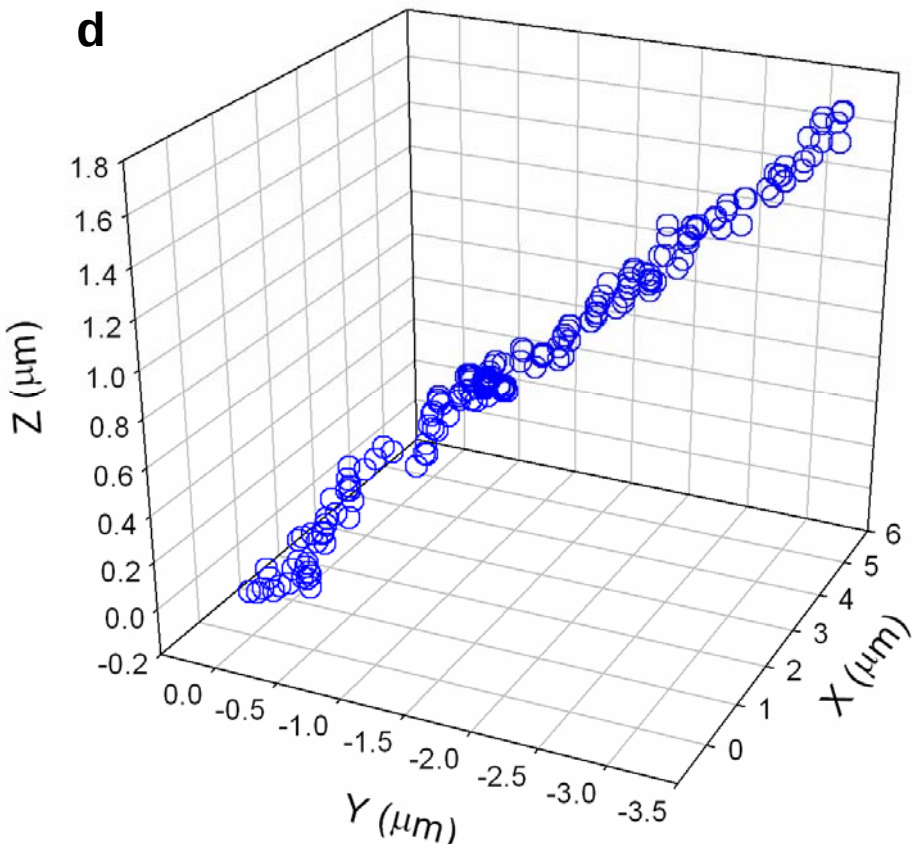

d
Z (μm)
Y (μm)
X (μm)

Fig.S5

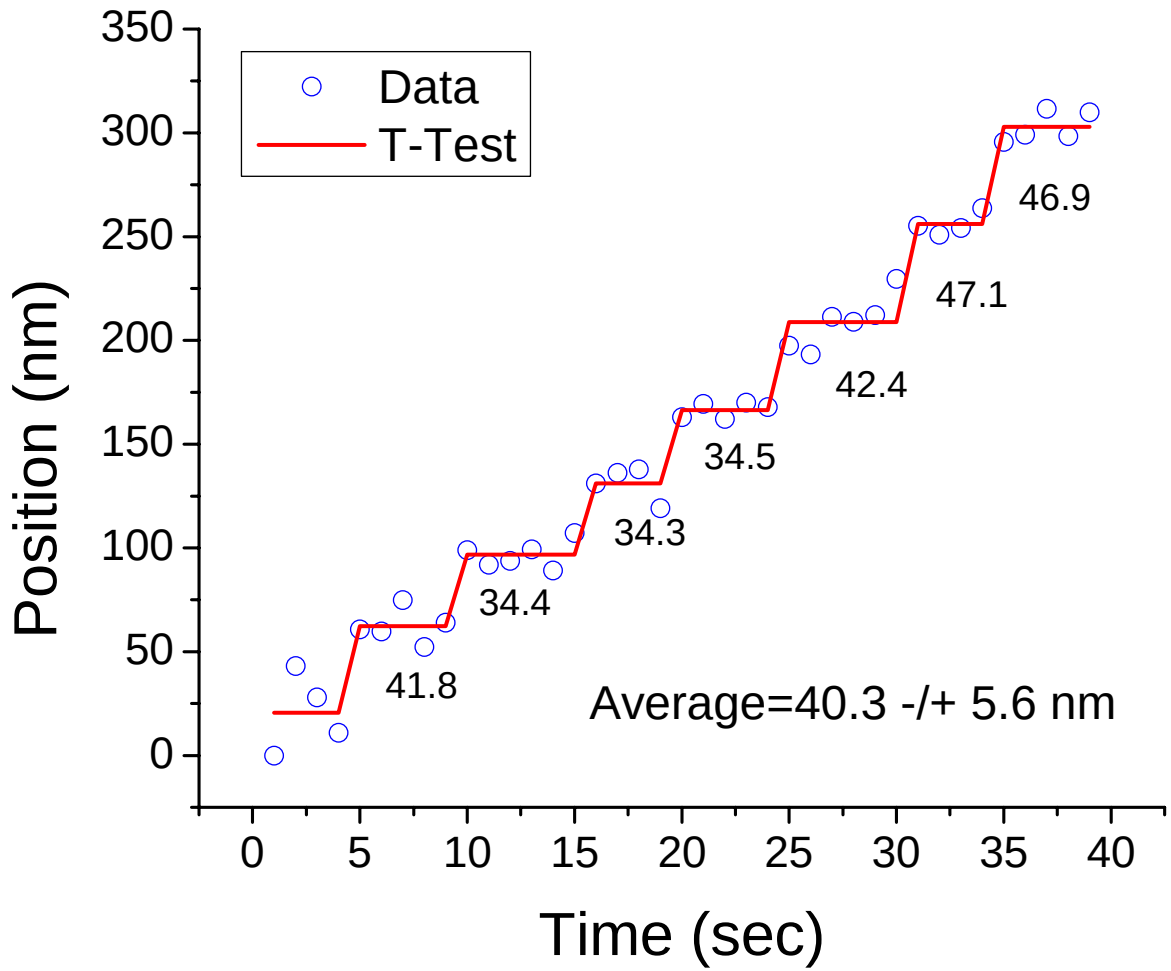
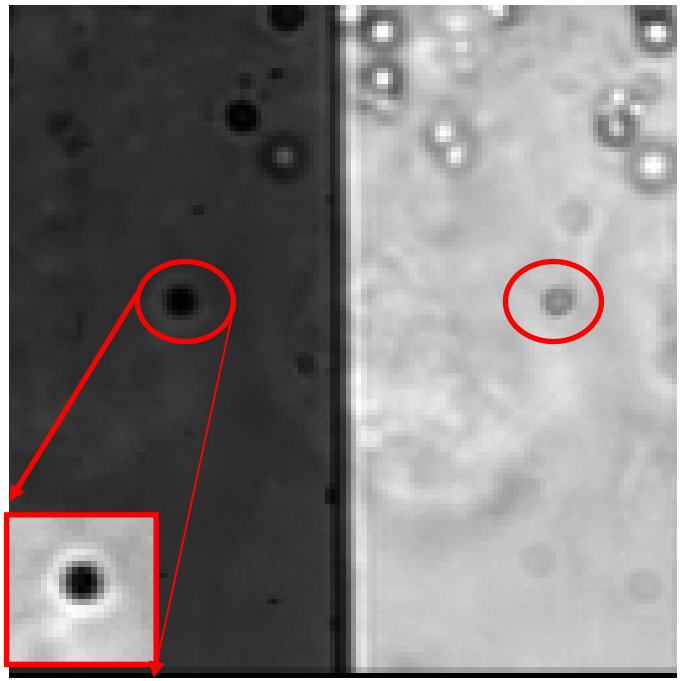

Data
T-Test
Position (nm)
Time (sec)
0
50
100
150
200
250
300
350
0
5
10
15
20
25
30
35
40
41.8
34.4
34.3
34.5
42.4
47.1
46.9
Average=40.3 -/+ 5.6 nm

Fig.S6

a

b



c

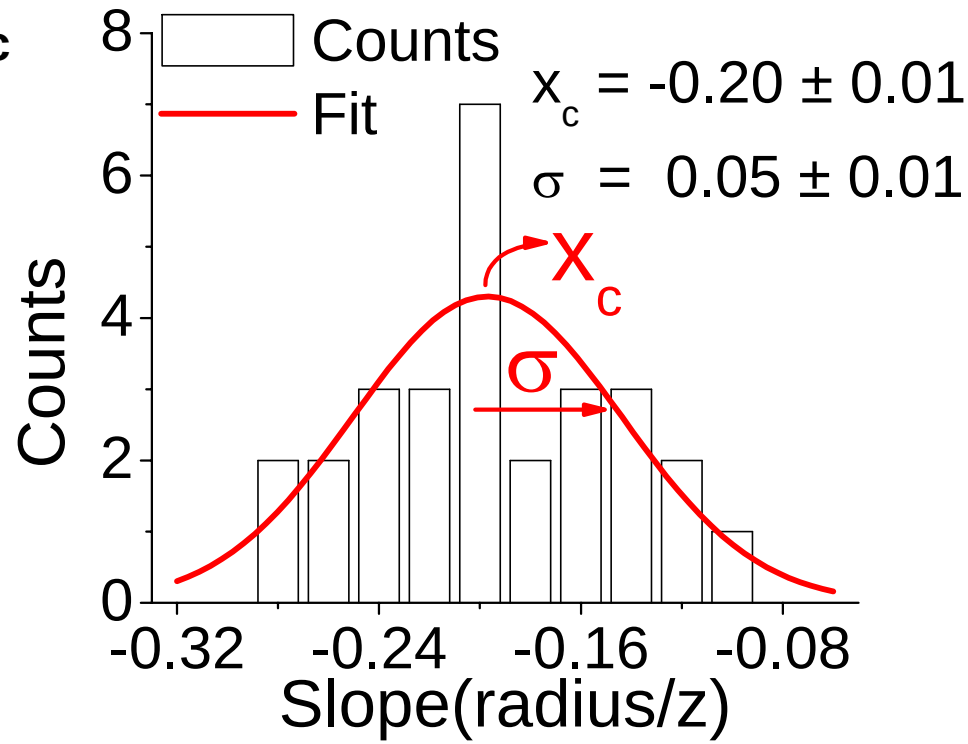
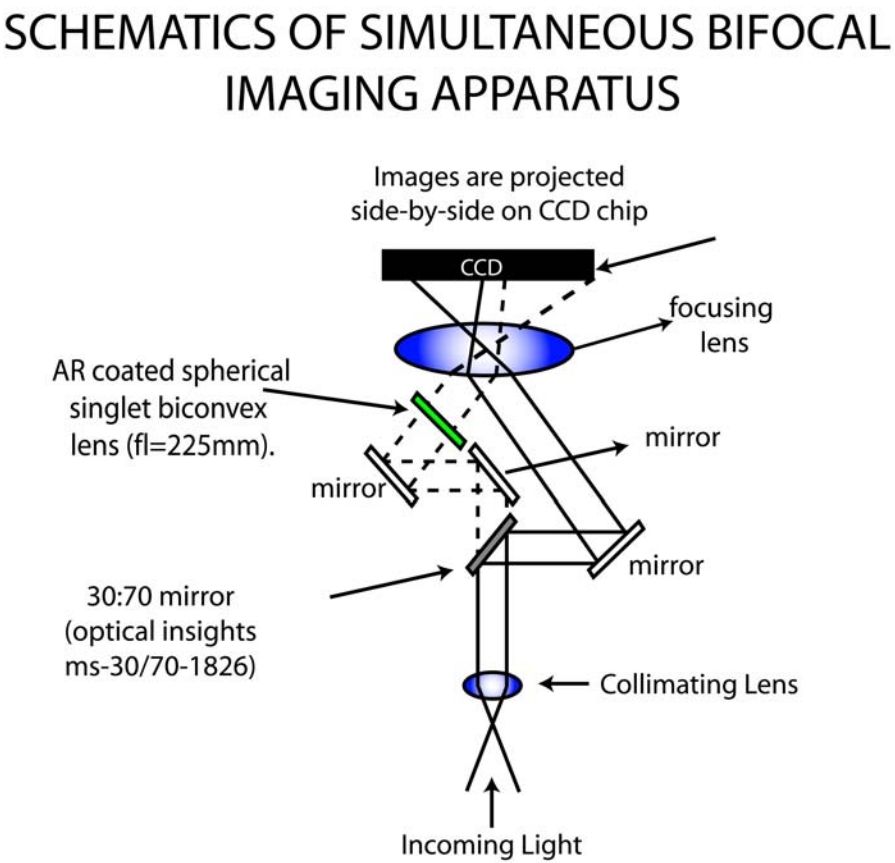

Counts
Fit
x_c = -0.20 ± 0.01
σ = 0.05 ± 0.01
x_c
σ
Counts
0
2
4
6
8
-0.32
-0.24
-0.16
-0.08
Slope(radius/z)

Fig.S7


SCHEMATICS OF SIMULTANEOUS BIFOCAL IMAGING APPARATUS
Images are projected side-by-side on CCD chip
CCD
focusing lens
AR coated spherical singlet biconvex lens (fl=225mm).
mirror
mirror
mirror
30:70 mirror (optical insights ms-30/70-1826)
Collimating Lens
Incoming Light