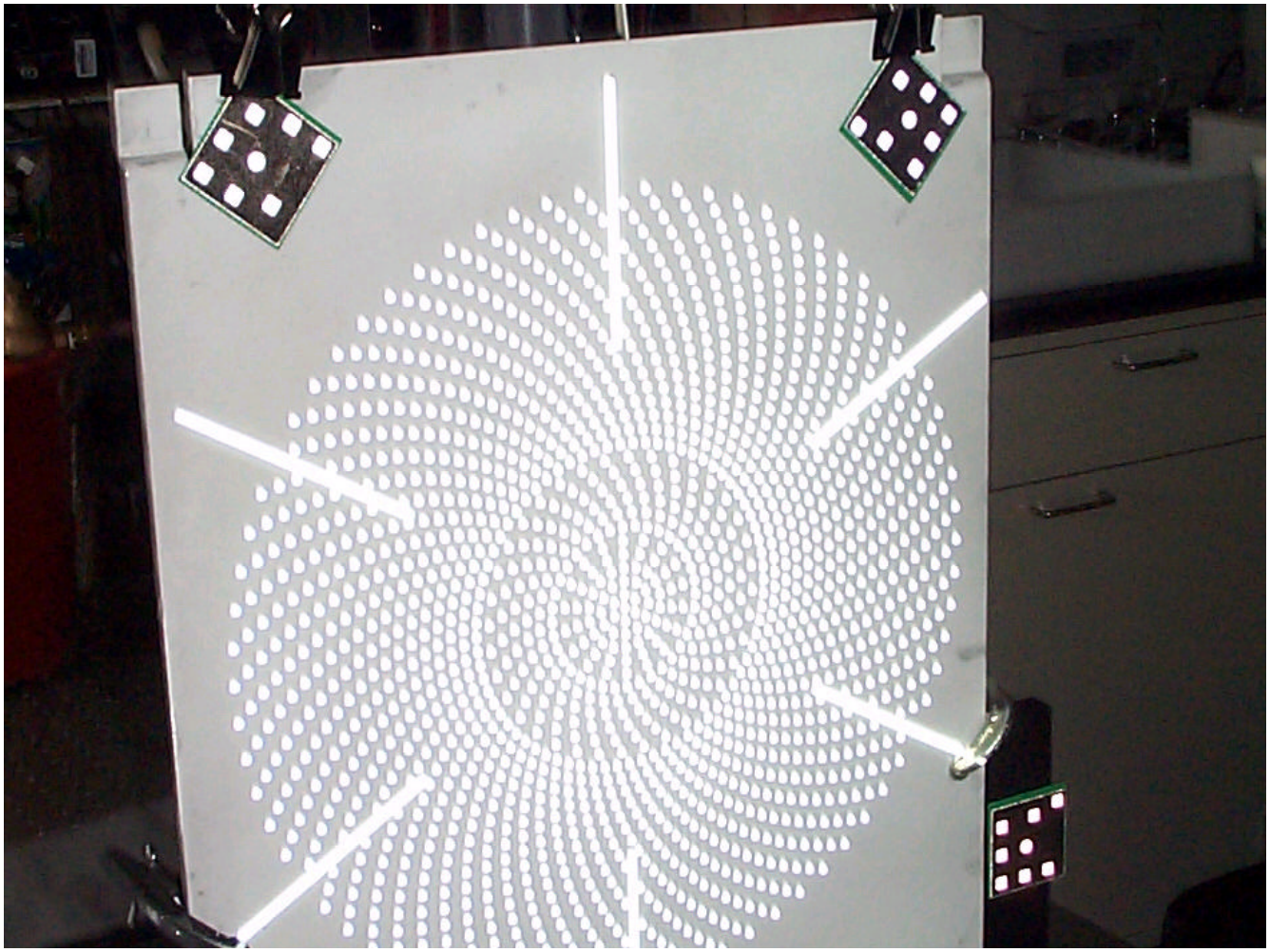
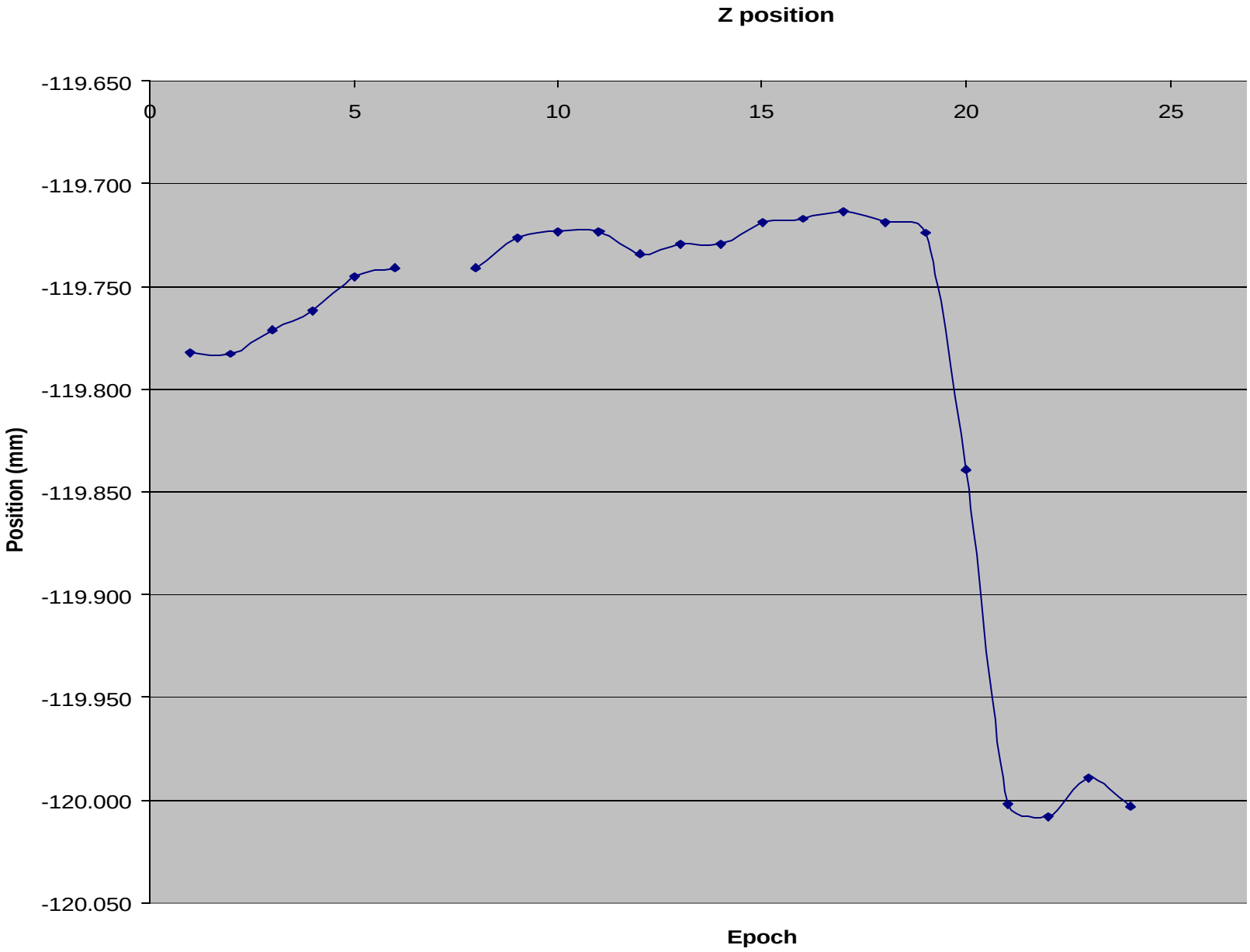
Review of Window testing

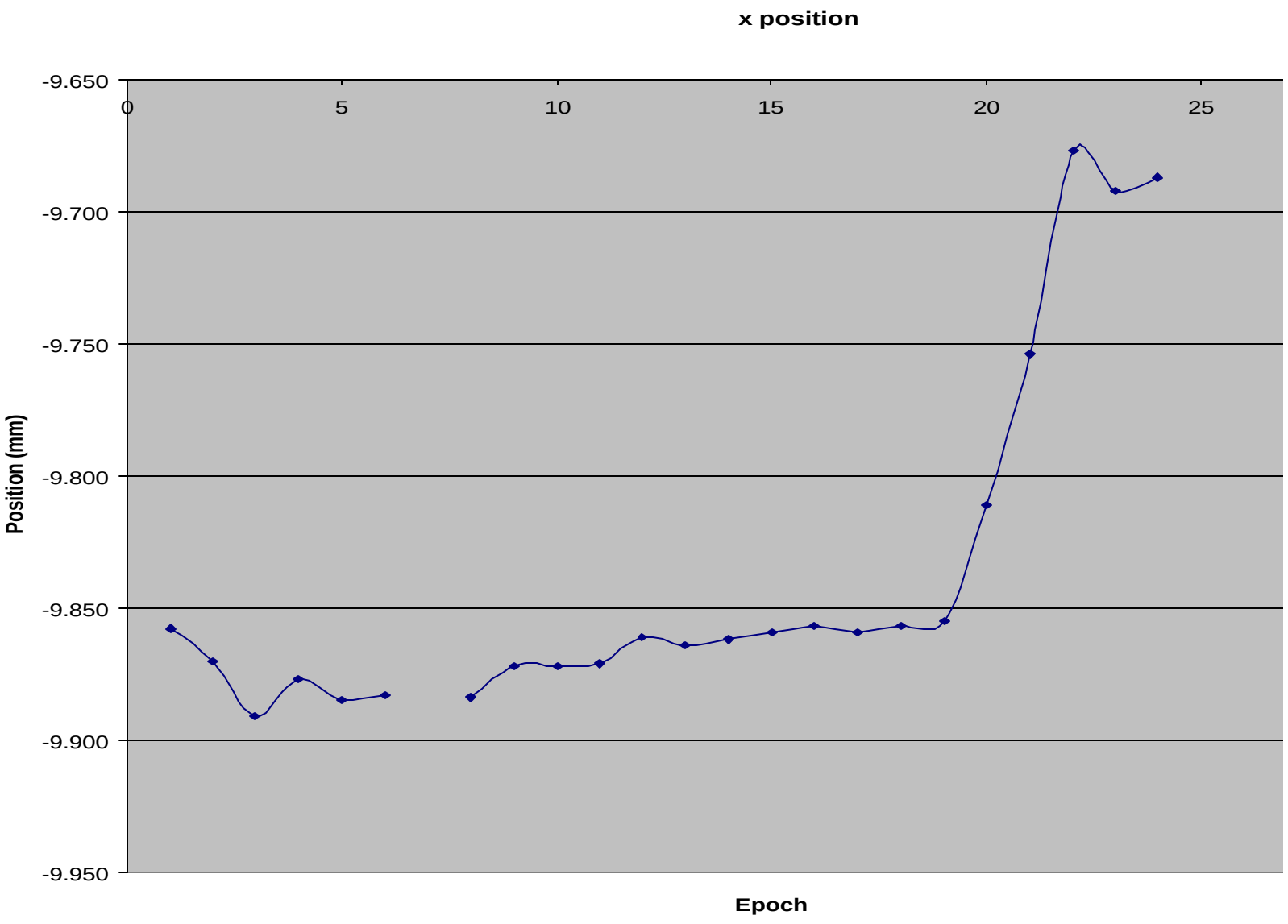
November 26, 2001 Donna Kubik

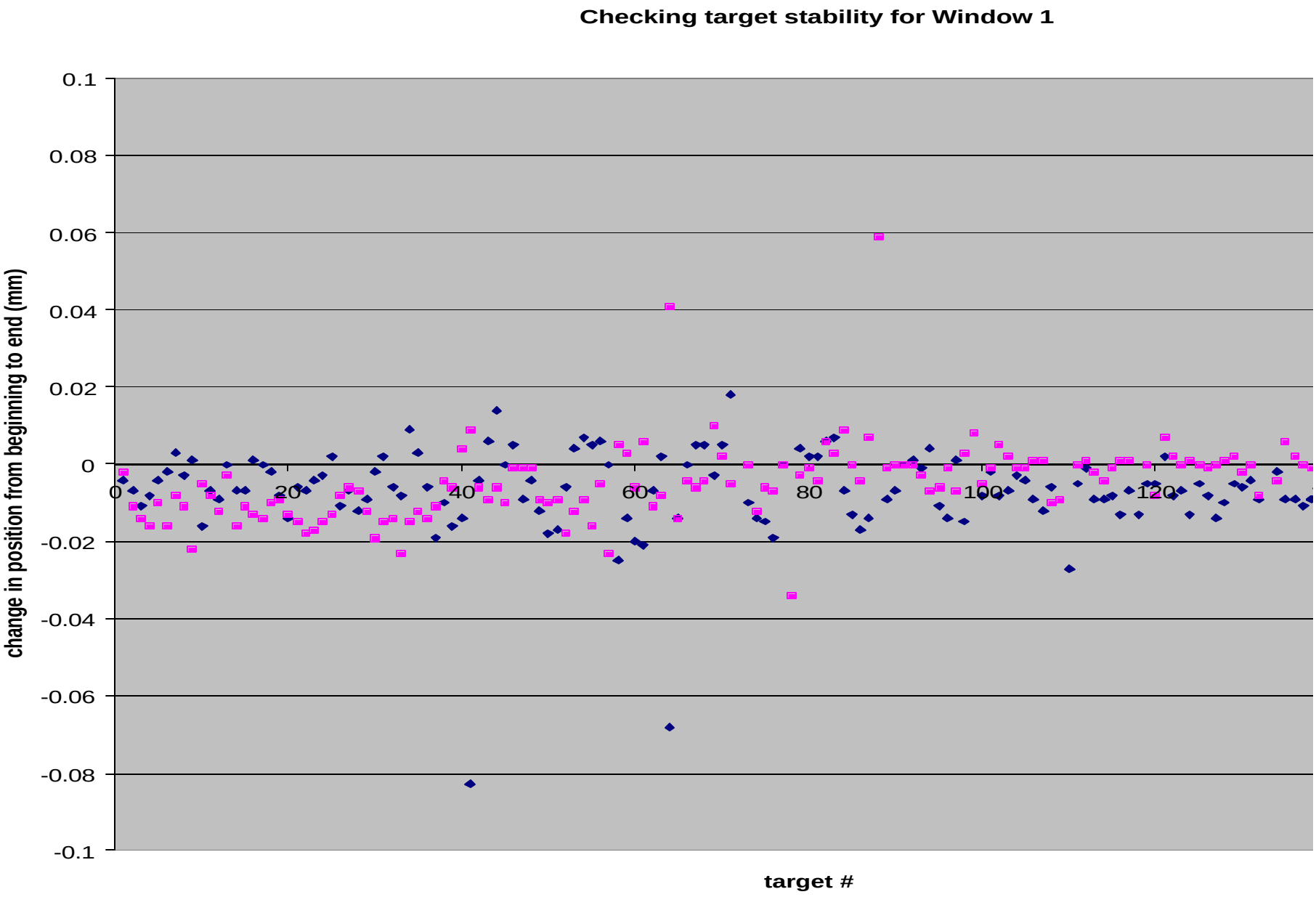


Window 2 tests

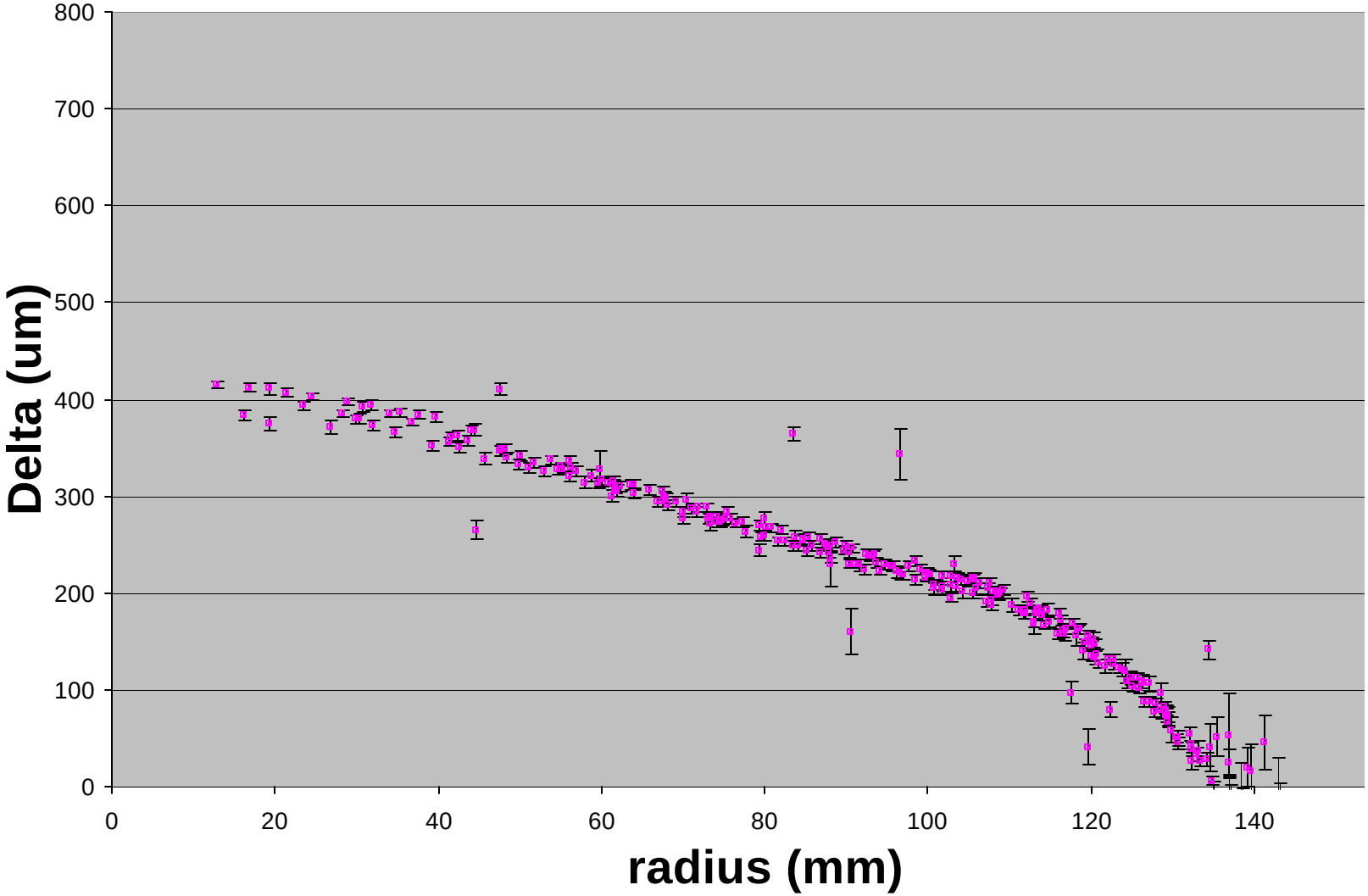
- Problem with target motion
  - Evidence
    - Perform stability tests
    - Permission to use VSTARs at FNAL Survey/Metrology facility
- Comparison with FEA
  - Wing's (linear + post-yield) FEA
  - Christine's (linear) FEA
    - Wing plans to simulate Window 1


Z position
-119.650
-119.700
-119.750
-119.800
-119.850
-119.900
-119.950
-120.000
-120.050
0
5
10
15
20
25
Position (mm)
Epoch

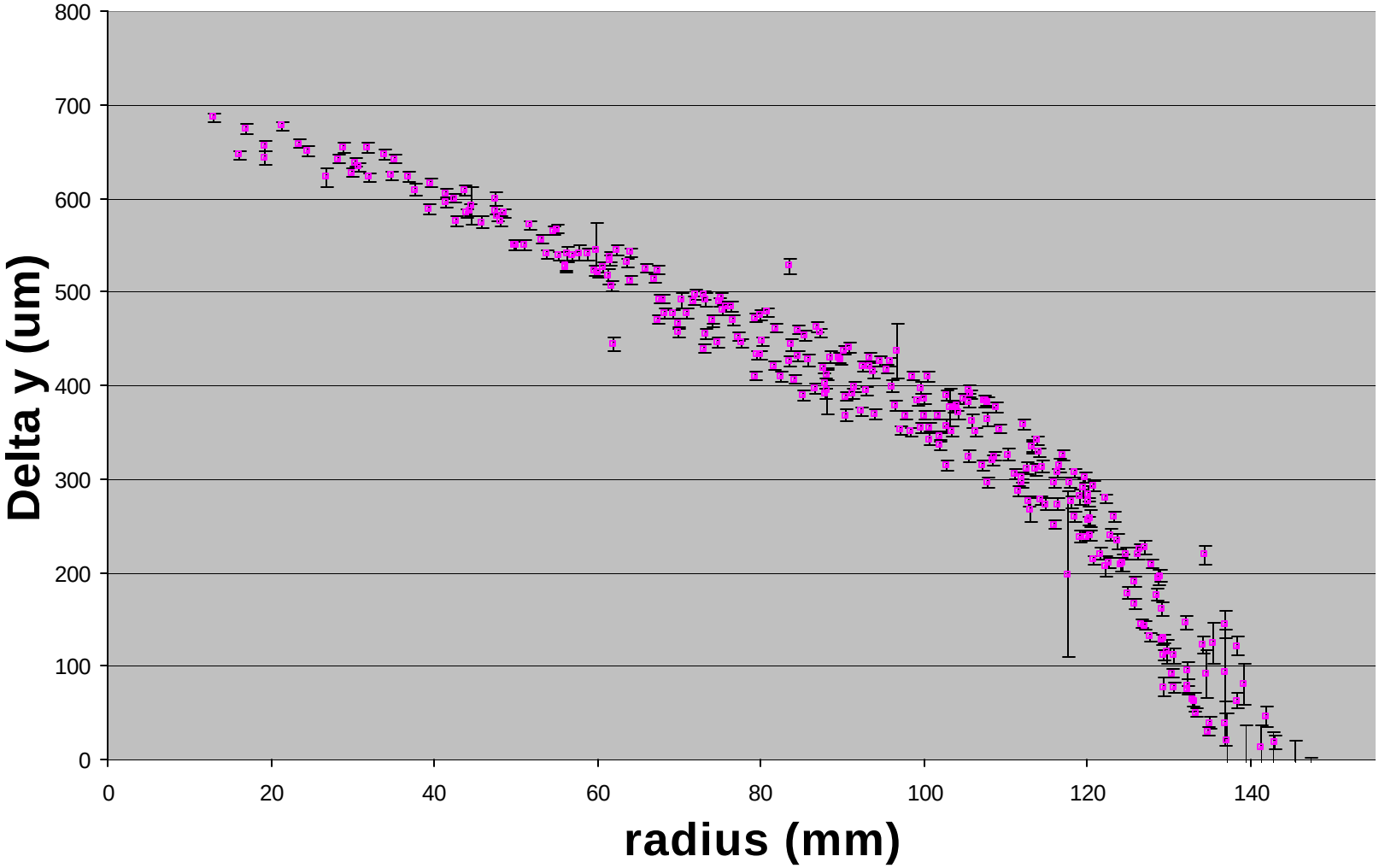

x position
-9.650
-9.700
-9.750
-9.800
-9.850
-9.900
-9.950
0
5
10
15
20
25
Position (mm)
Epoch

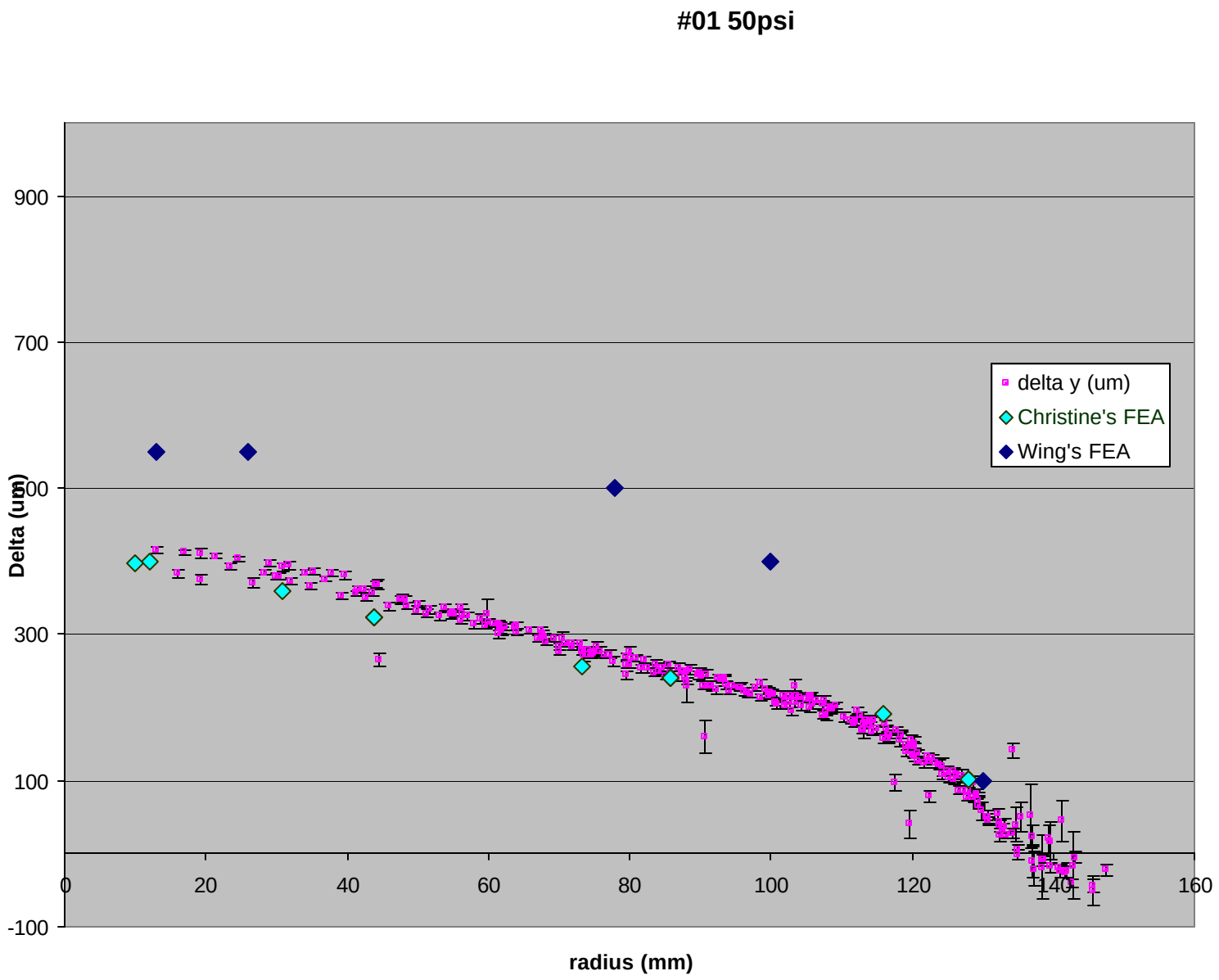

Checking target stability for Window 1
0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
0
20
40
60
80
100
120
change in position from beginning to end (mm)
target #

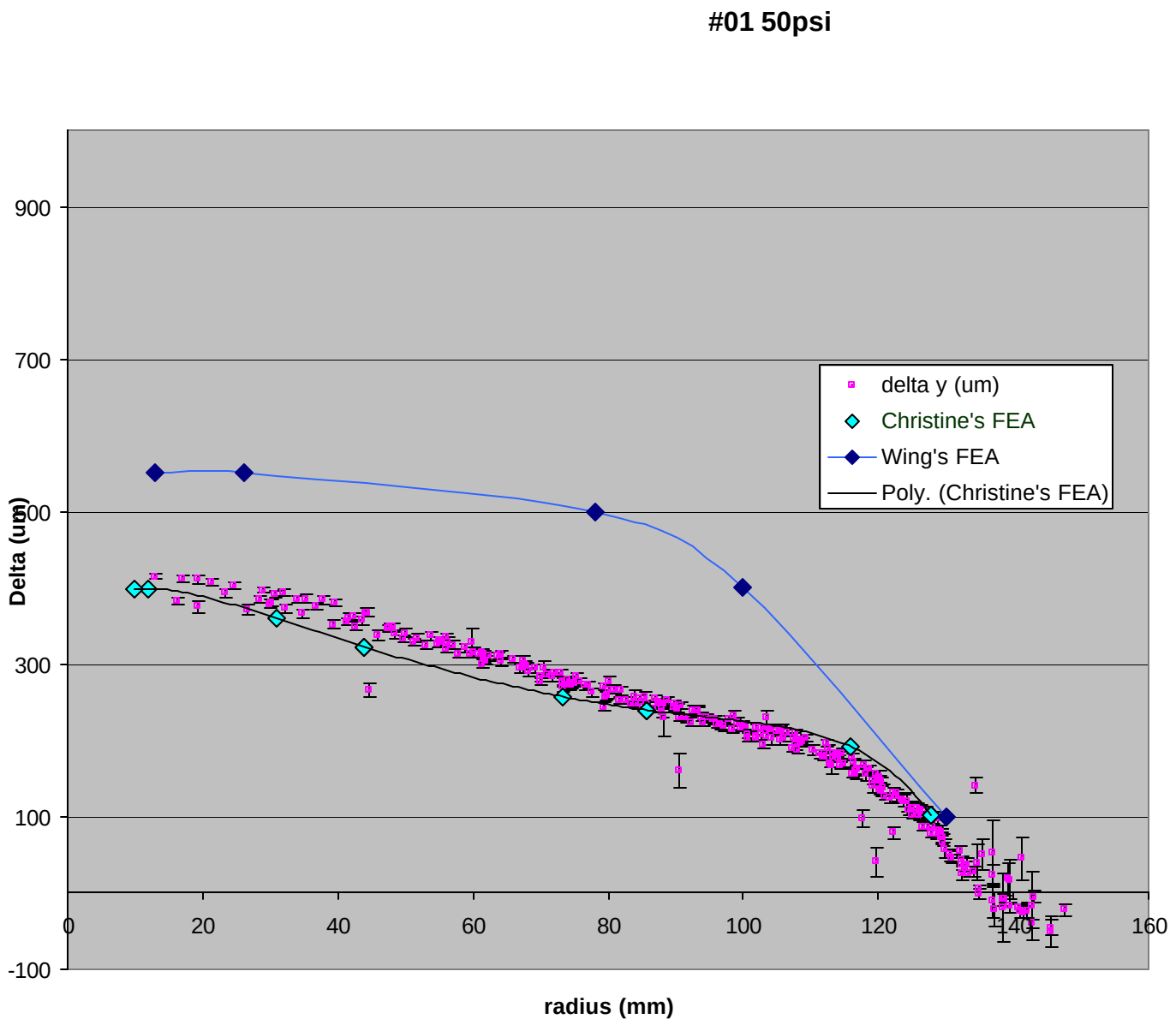
1 50psi (training cycle #1)

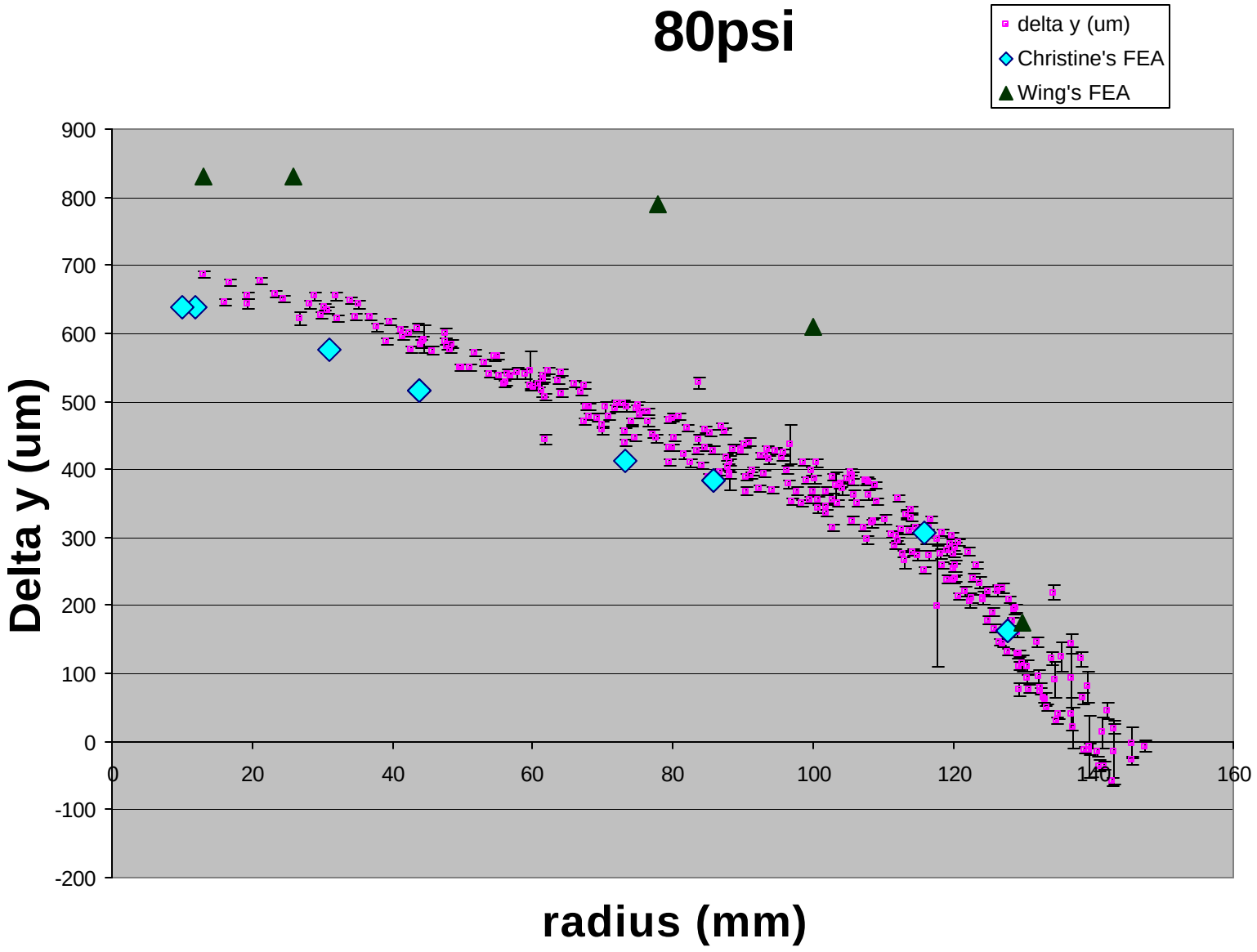


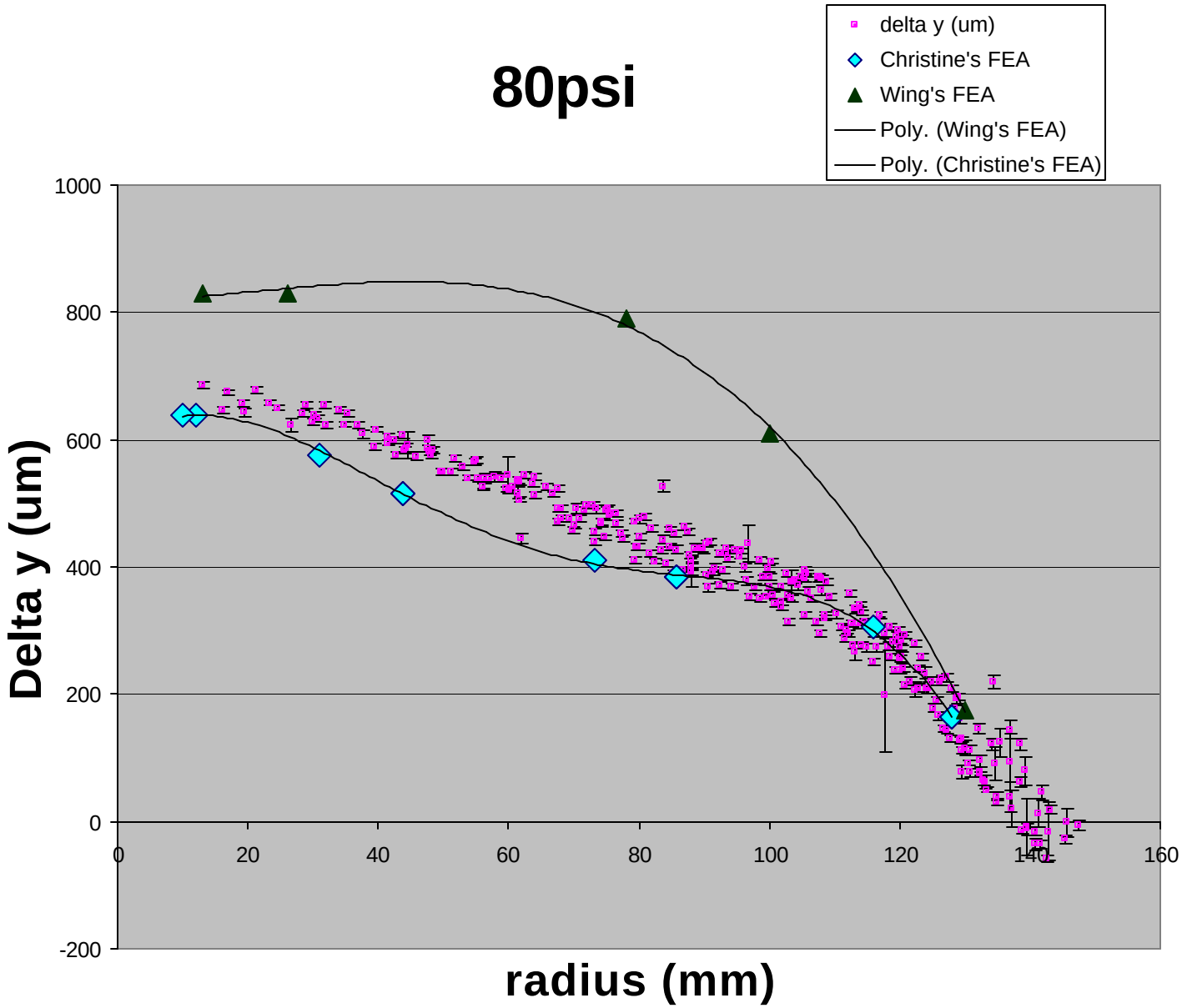
80psi


Delta y (um)
800
700
600
500
400
300
200
100
0
0
20
40
60
80
100
120
140
radius (mm)


#01 50psi
900
700
500
300
100
-100
Delta (um)
0
20
40
60
80
100
120
140
160
radius (mm)
delta y (um)
Christine's FEA
Wing's FEA


#01 50psi
900
700
500
300
100
-100
Delta (um)
0
20
40
60
80
100
120
140
160
radius (mm)
delta y (um)
Christine's FEA
Wing's FEA
Poly. (Christine's FEA)


80psi
delta y (um)
Christine's FEA
Wing's FEA
Delta y (um)
900
800
700
600
500
400
300
200
100
0
-100
-200
0
20
40
60
80
100
120
140
160
radius (mm)


80psi
delta y (um)
Christine's FEA
Wing's FEA
Poly. (Wing's FEA)
Poly. (Christine's FEA)
Delta y (um)
radius (mm)
1000
800
600
400
200
0
-200
0
20
40
60
80
100
120
140
160

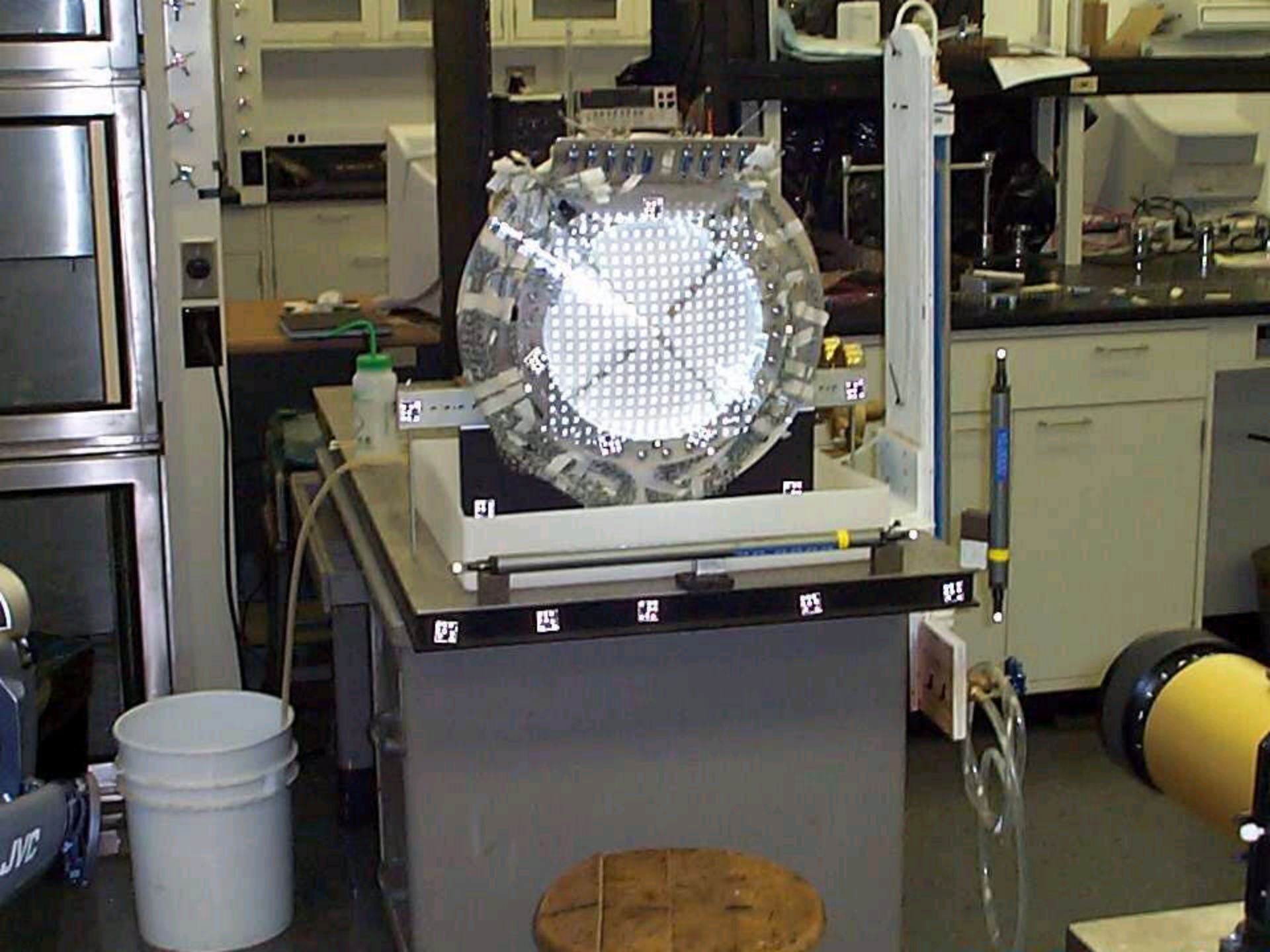
Improvements/changes

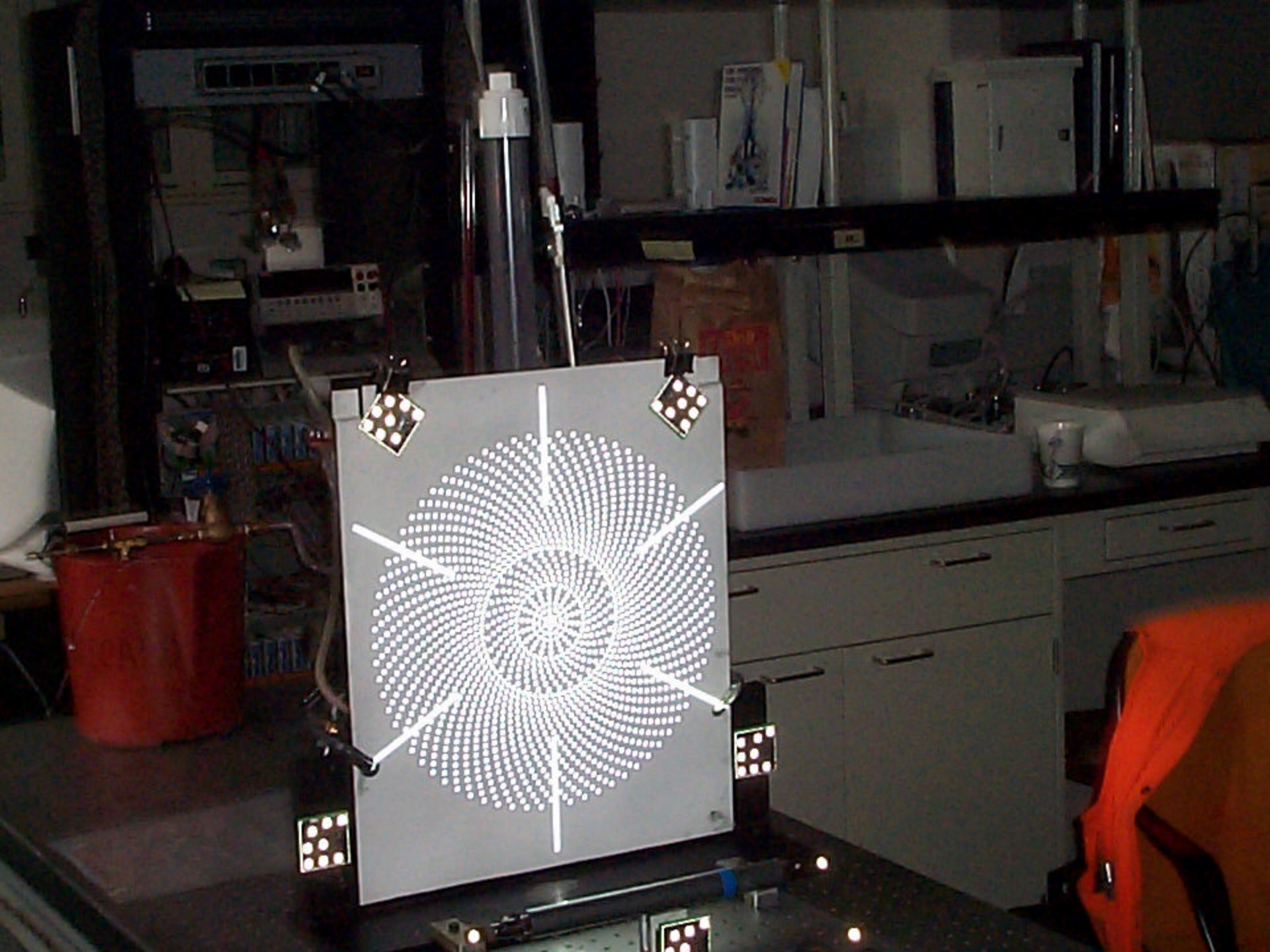
- New projected target pattern
- Decouple window from pressurization system
- No strain gages

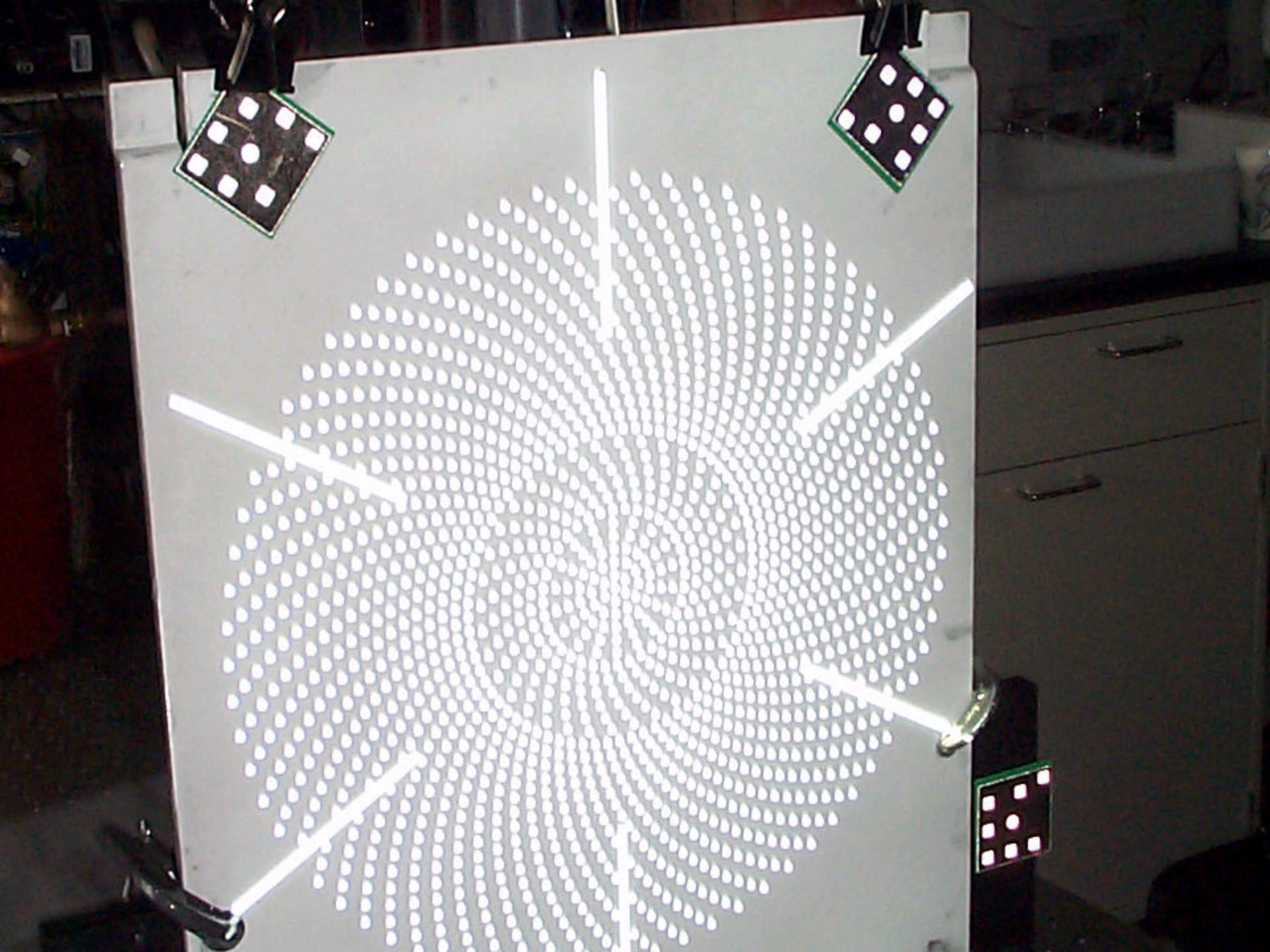
Density of projected targets

- Old slide
  - 15 cm window, 140 targets

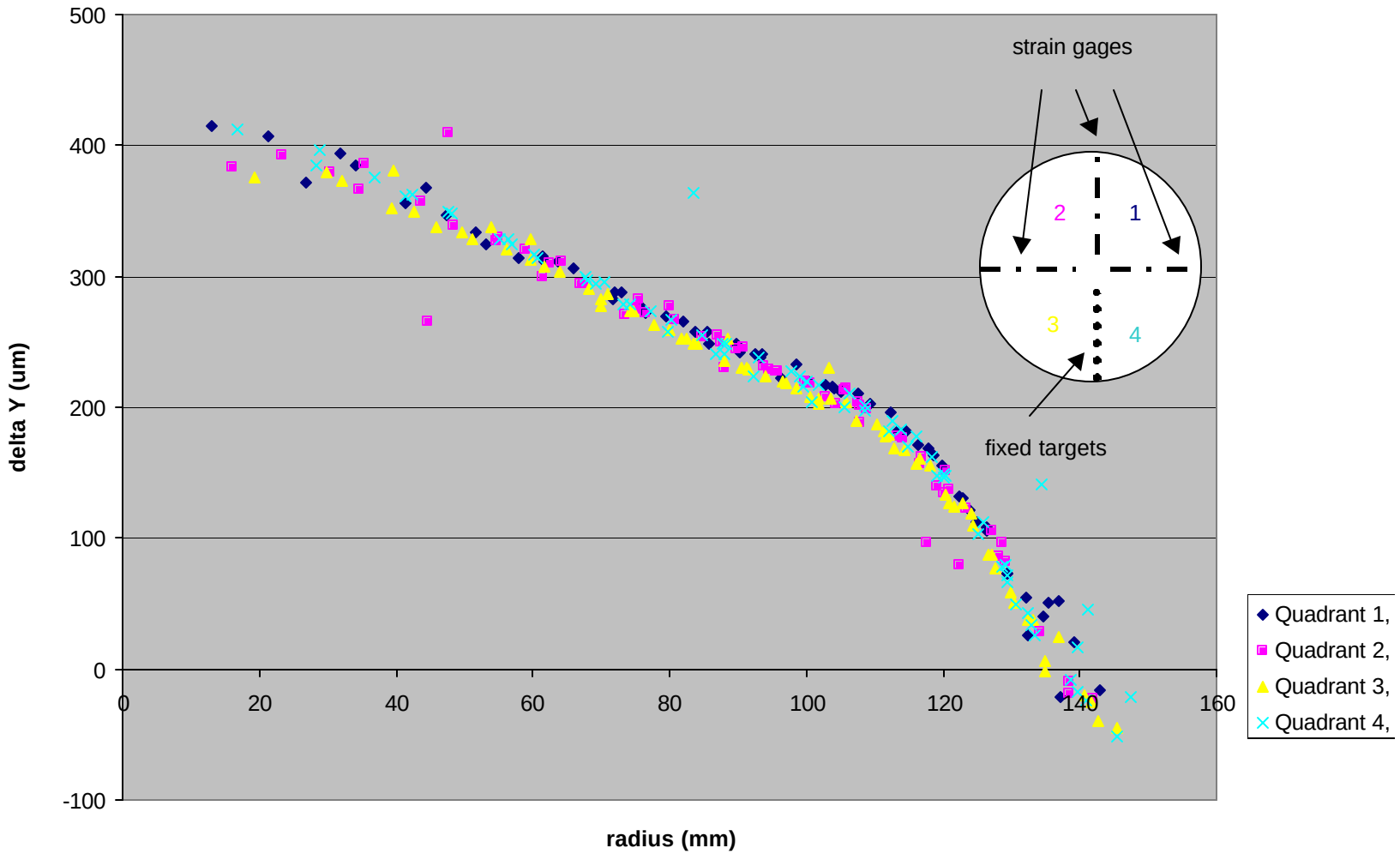
- New slide
  - 11 cm window, 865 targets
  - 15 cm window, 1297 targets
  - 18 cm window, 1657 targets


JVC

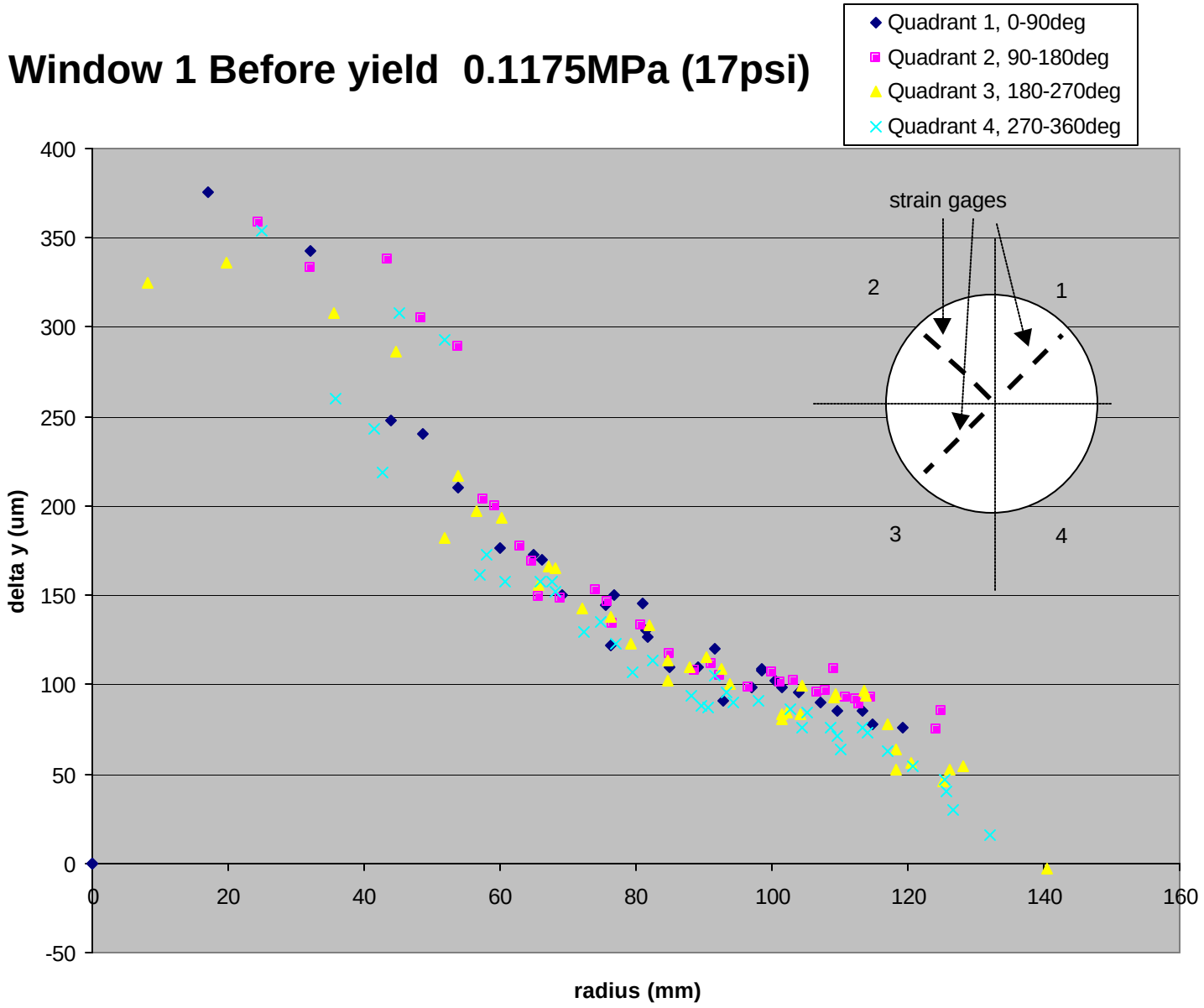


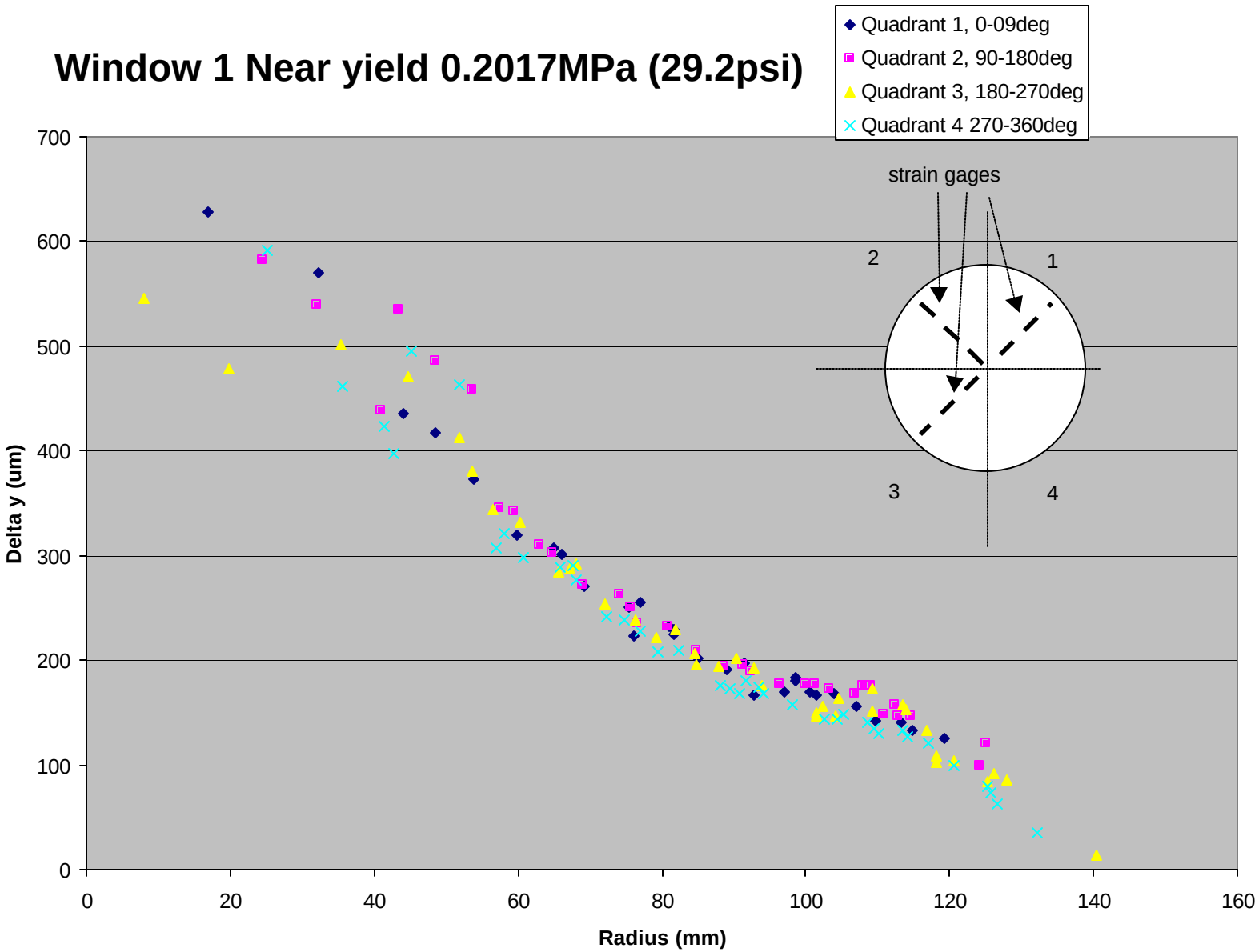


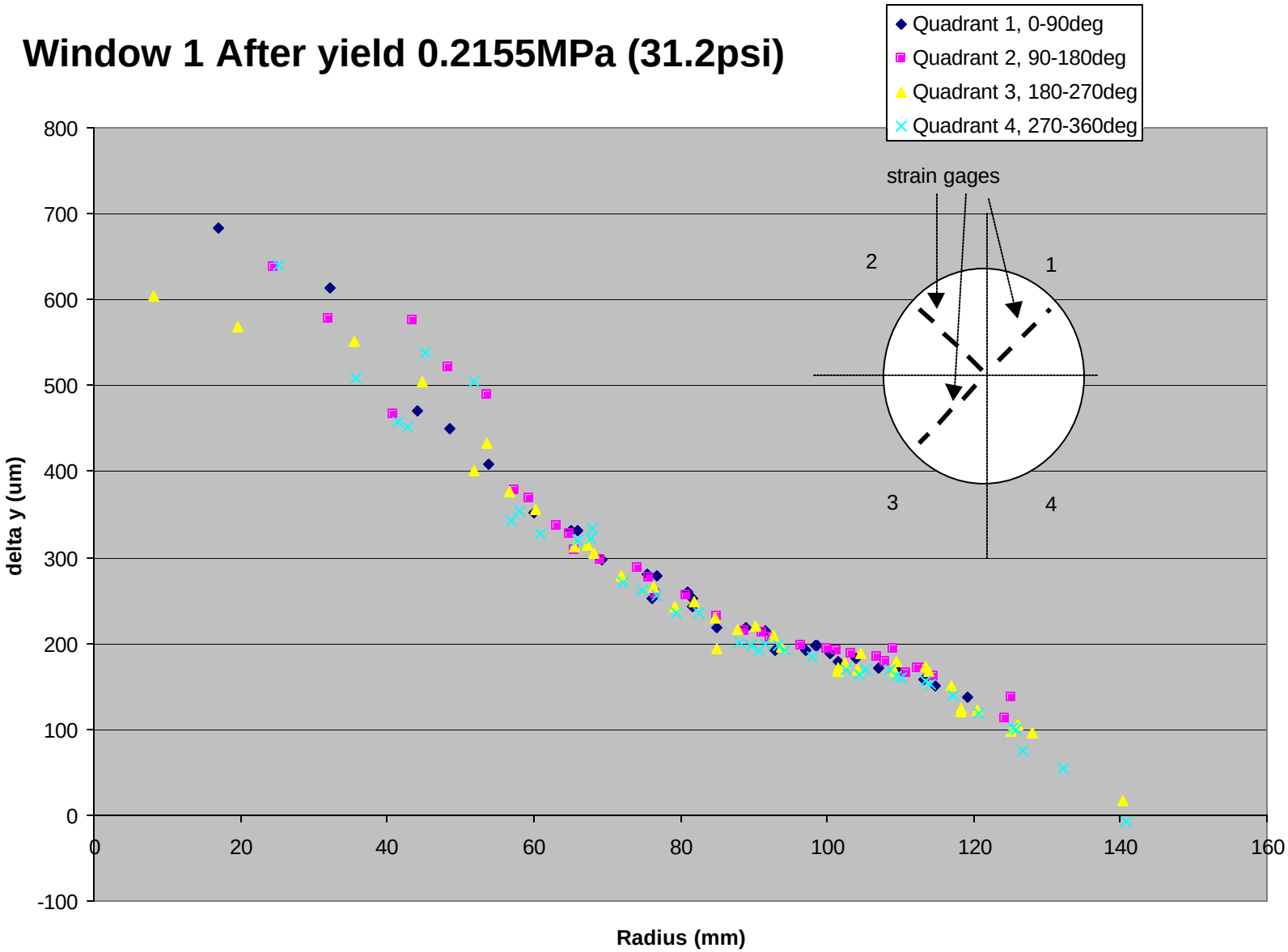
Window 2 before yield 50psi

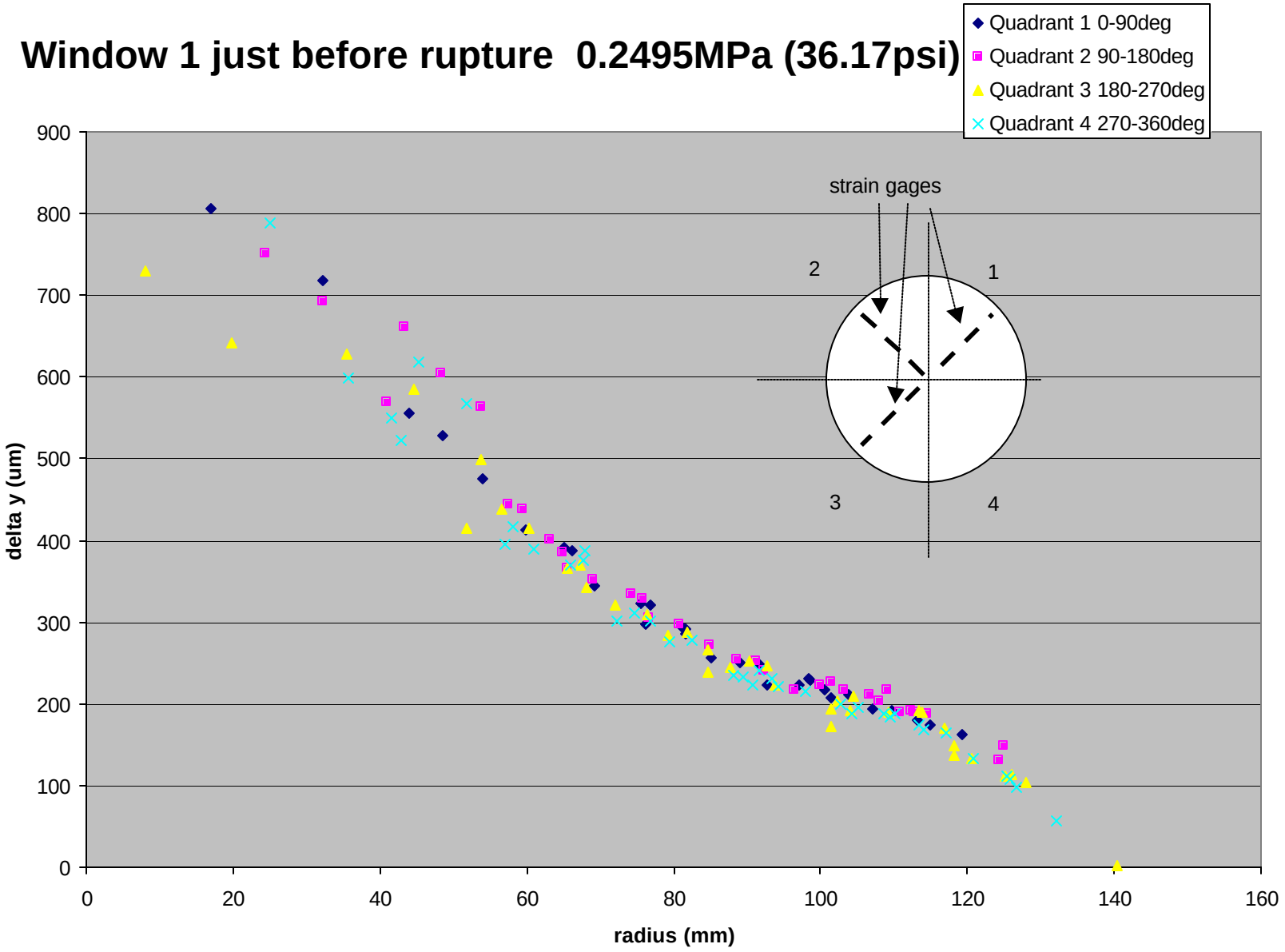


Window 1 Before yield 0.1175MPa (17psi)




Window 1 Near yield 0.2017MPa (29.2psi)
Quadrant 1, 0-09deg
Quadrant 2, 90-180deg
Quadrant 3, 180-270deg
Quadrant 4 270-360deg
strain gages
2
1
3
4
Delta y (um)
Radius (mm)
0
100
200
300
400
500
600
700
0
20
40
60
80
100
120
140
160


Window 1 After yield 0.2155MPa (31.2psi)
Quadrant 1, 0-90deg
Quadrant 2, 90-180deg
Quadrant 3, 180-270deg
Quadrant 4, 270-360deg
strain gages
1
2
3
4
delta y (um)
Radius (mm)
800
700
600
500
400
300
200
100
0
-100
0
20
40
60
80
100
120
140
160


Window 1 just before rupture 0.2495MPa (36.17psi)
Quadrant 1 0-90deg
Quadrant 2 90-180deg
Quadrant 3 180-270deg
Quadrant 4 270-360deg
strain gages
2
1
3
4
delta y (um)
radius (mm)
0
100
200
300
400
500
600
700
800
900
0
20
40
60
80
100
120
140
160