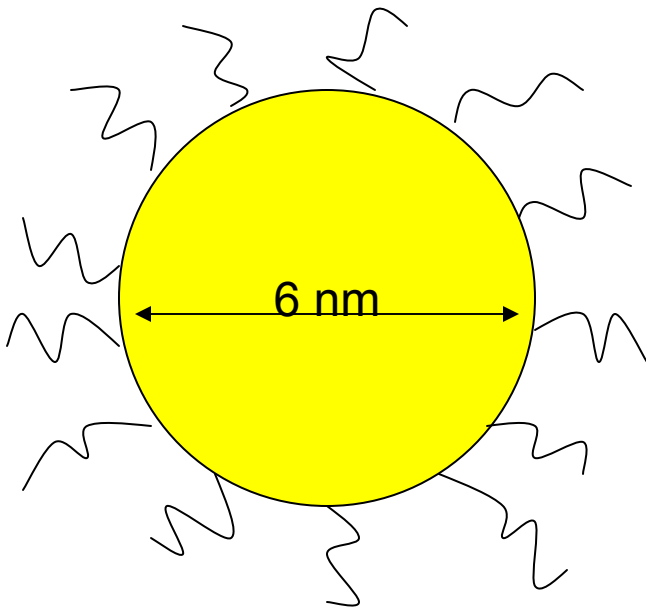


# X-Ray Studies of a Gold Nanosphere Monolayer

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# System Studied

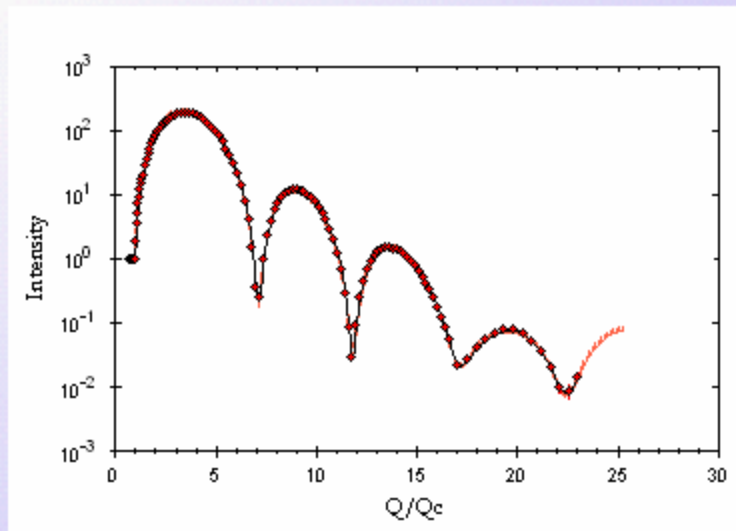
- Gold nanosphere monolayers



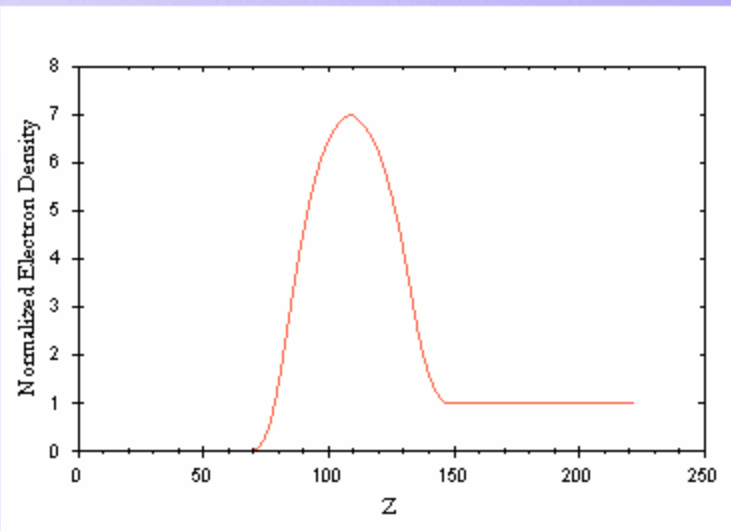
QuickTime™ and a  
TIFF (LZW) decompressor  
are needed to see this picture.

# Reflectivity

## Graph Collection



Surface Layer Density=5  
Surface Layer Length=55  
Surface Layer MW=679  
Surface Layer e- Count=401  
Surface Layer Absorption= $1e-5$



Density of Subphase=0.996  
Subphase Absorption= $3e-8$   
Subphase MW=18  
Subphase e- Count=10  
X-Ray wavelength=1.24

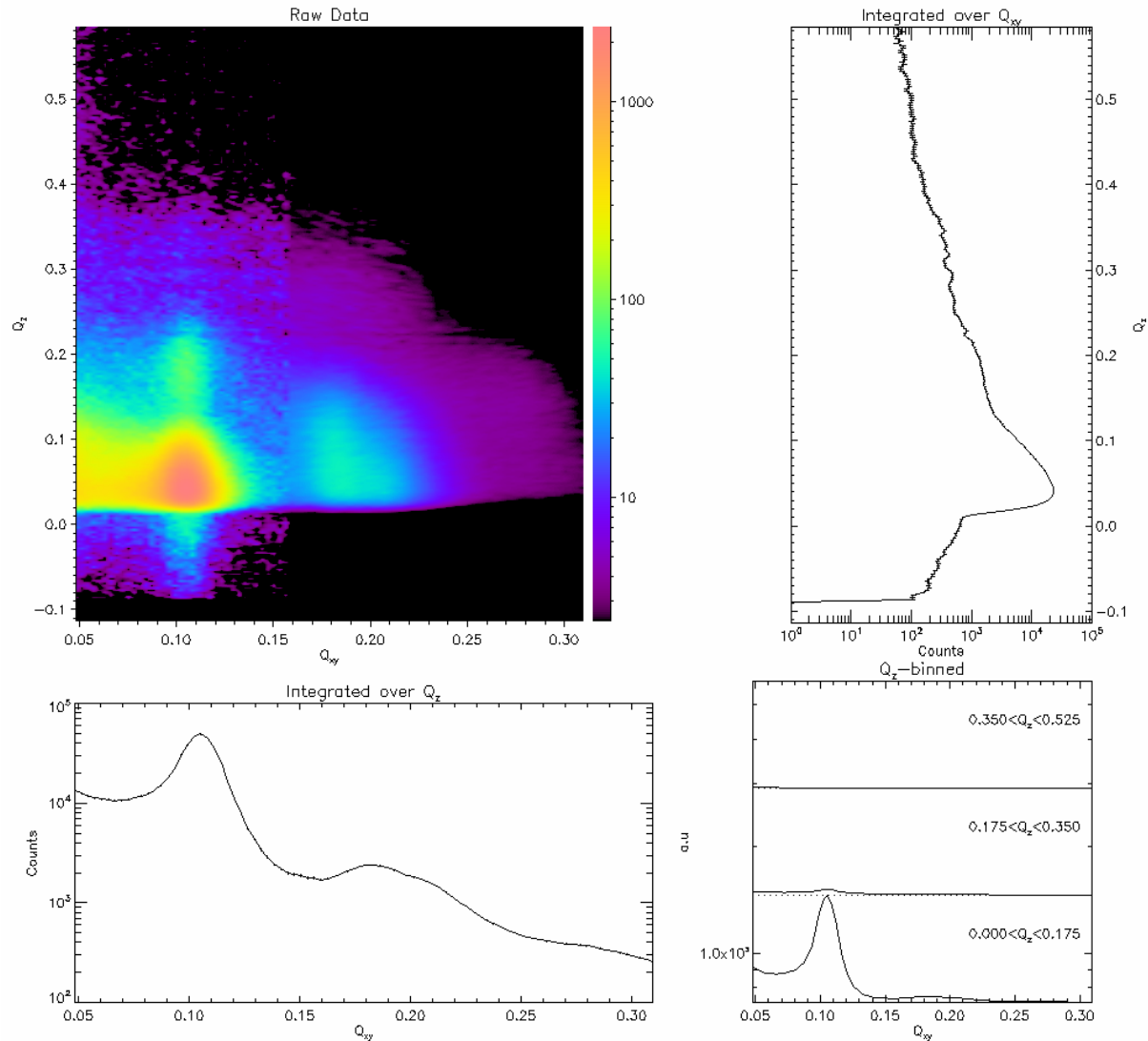
Chi square=8.8925

# Reflectivity Conclusions

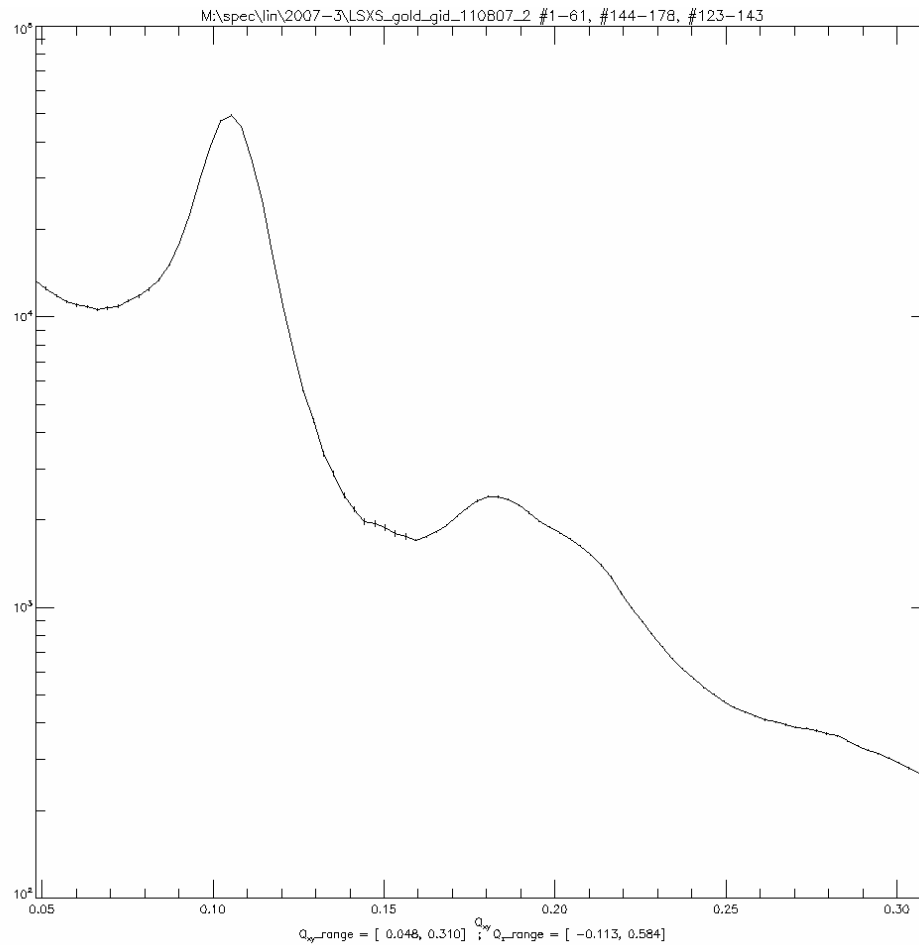
- Roughness of surface was 4.6 Å
- Relative electron density of gold particles is about 6 times greater than water
- Width of electron density peak gives size of particle ~60 Å

# GIXD: Raw Data

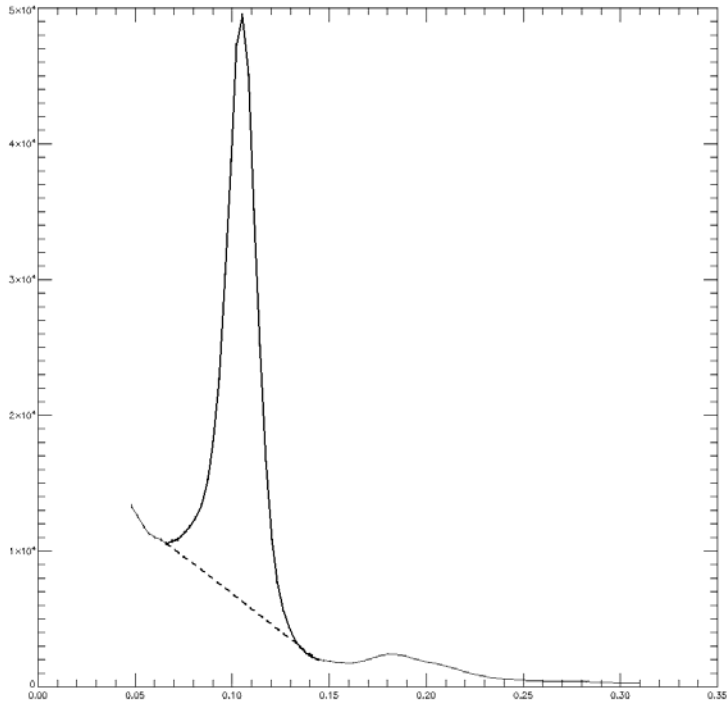
M:\spec\lin\2007-3\LSXS\_gold\_gid\_110807\_2 #1-61, #144-178, #123-143  
 $Q_y$  range = [ 0.048, 0.310] ;  $Q_z$  range = [ -0.113, 0.584]



# GIXD: Analysis



# GIXD: Analysis



Peak 1 {1 0}:  
Center at  $0.103534 \text{ \AA}^{-1}$   
FWHM is  $0.0179797 \text{ \AA}^{-1}$

Peak 2 {1 1}:  
Center at  $0.181368 \text{ \AA}^{-1}$

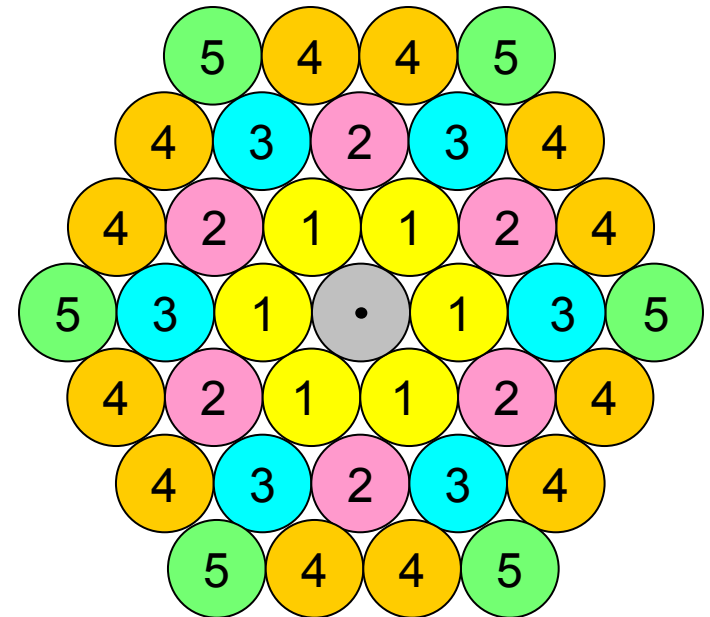
FWHM gives coherence length

$$d = 2\pi/q$$

Gives nearest neighbor distance

# GIXD: Conclusions

- Hexagonal Packing
- Center to center distance of 6.06 nm
- Coherence length of 30.88 nm
  - 5 particles



- $P_2/P_1 \sim \sqrt{3}$

- $P_3/P_1 \sim 2$

→ Implies hexagonal packing!



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