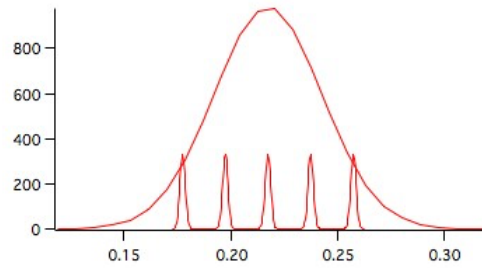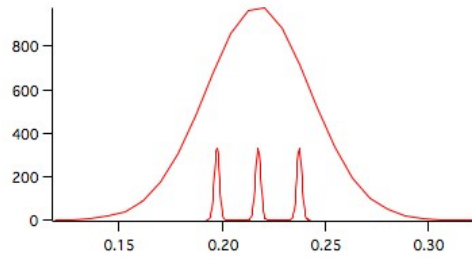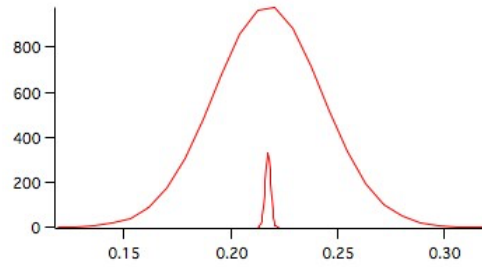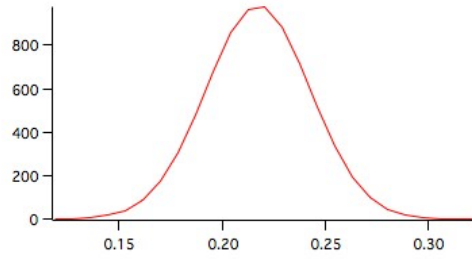# Range correction for LAGEOS-2 vs
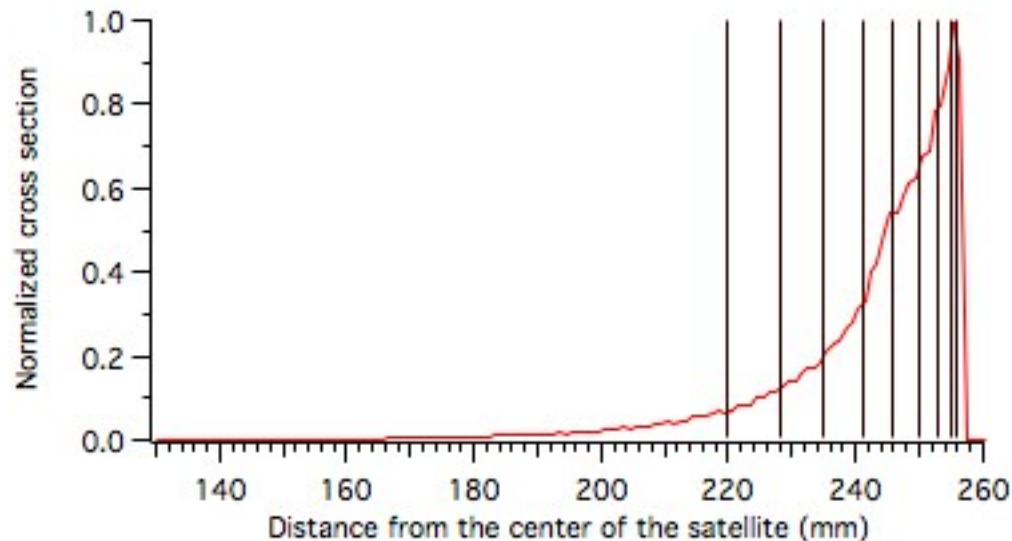### Pulse width, detector rise time, signal strength, and type of detection system

- Quantization
- Pulse histogram
- Data clipping
- Sample pulse shapes
- Range correction vs pulse length
- Range correction vs receiver rise time
- Range correction vs number of photoelectrons
- Range correction for various detection systems
- Target calibration
- Range correction for various stations
- CSPAD target test

Quantization

Histogram for LAGEOS-2

- Tail = 135.5 mm, Centroid = 242.5 mm, Leading edge = 256.5
- Leading edge – Centroid = 14 mm, Centroid – tail = 107 mm.
- Data clipping cuts off the tail and changes the range correction.
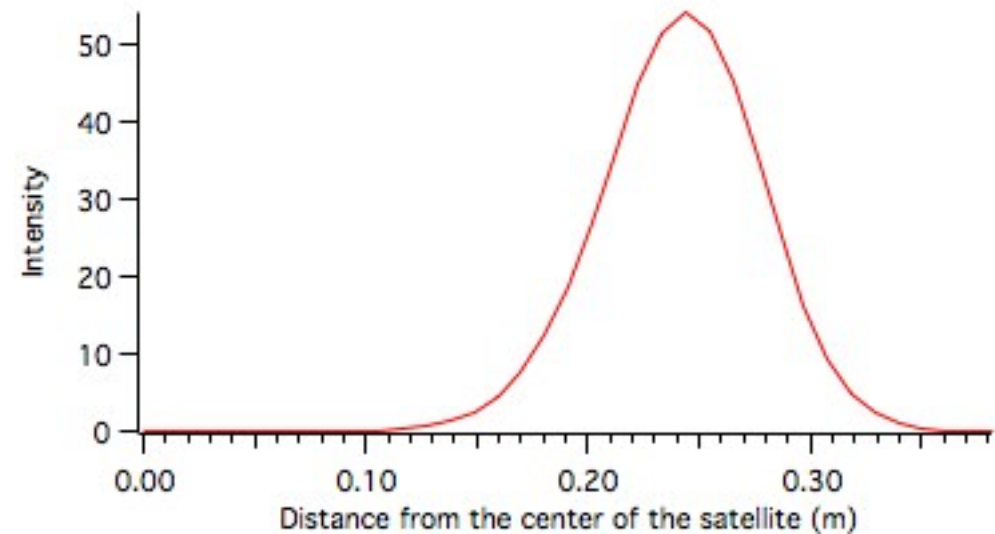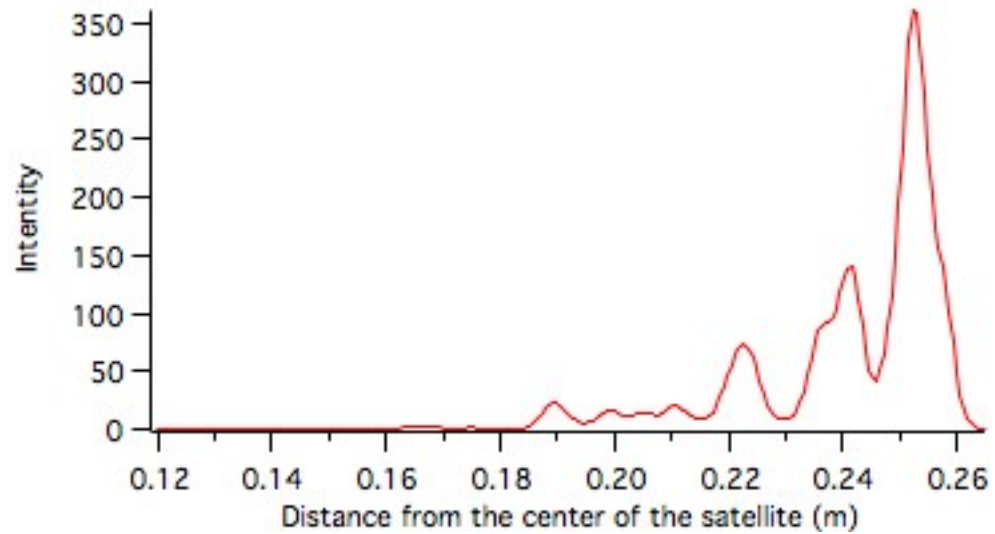- move the histogram to maximize the product of the two curves.

Data Clipping

- Change in range correction vs distance of the cutoff from the centroid
- range correction   difference in range correction

Sample pulse shapes
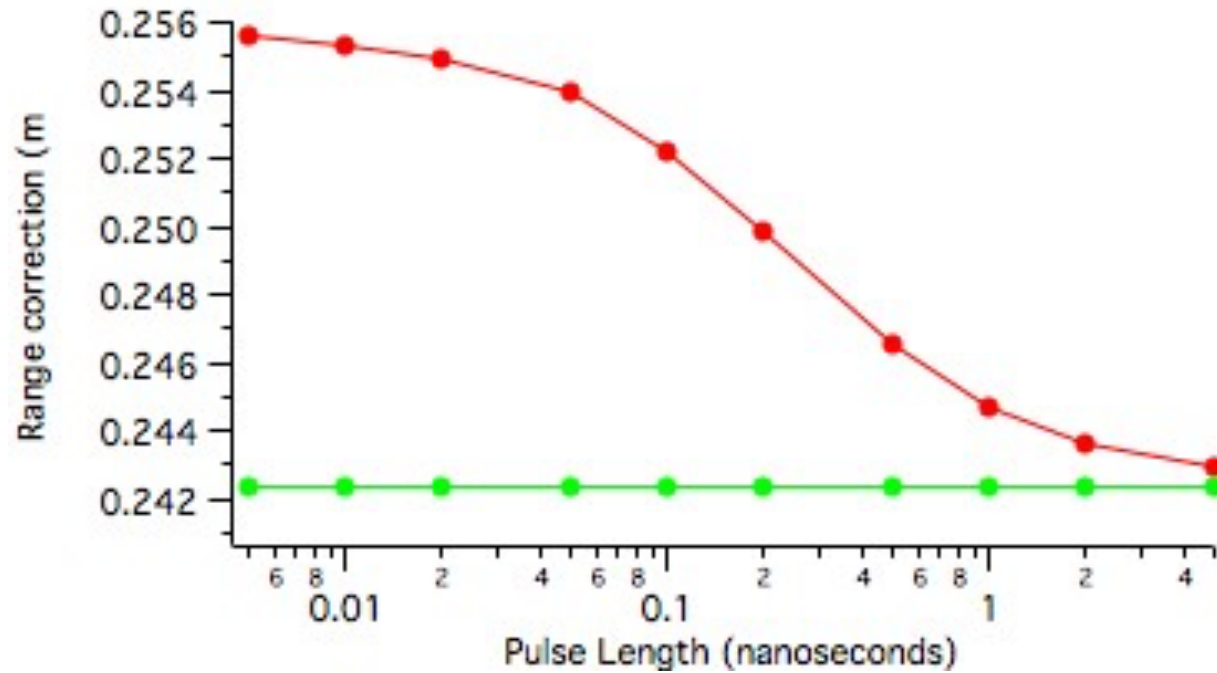
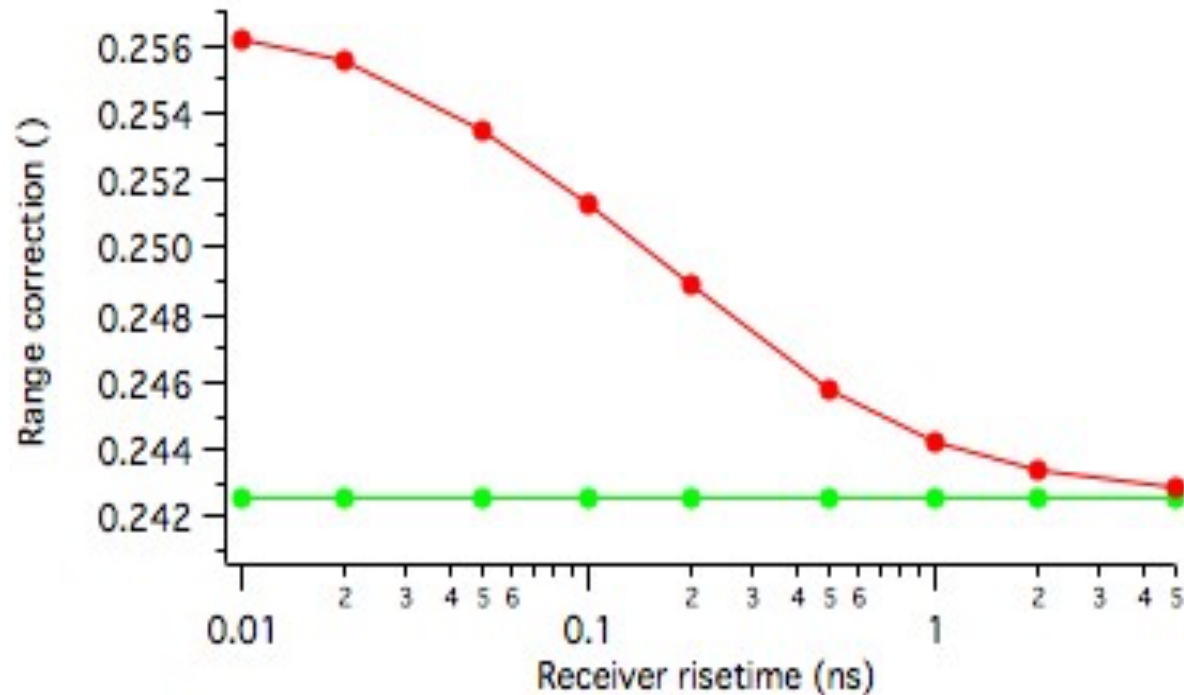- Pulse width   .03 ns   .50 ns

Range correction vs pulse width
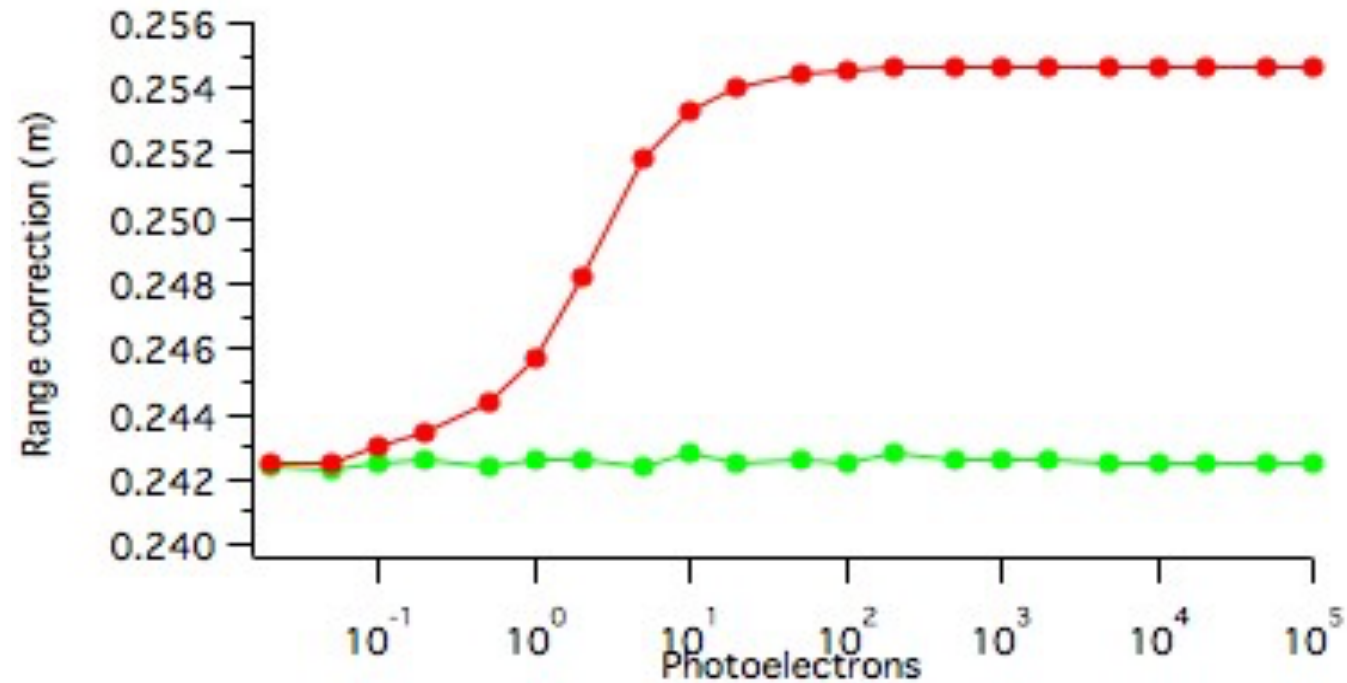
- Red = halfmax, Green = Centroid

Range Correction vs Receiver Rise Time

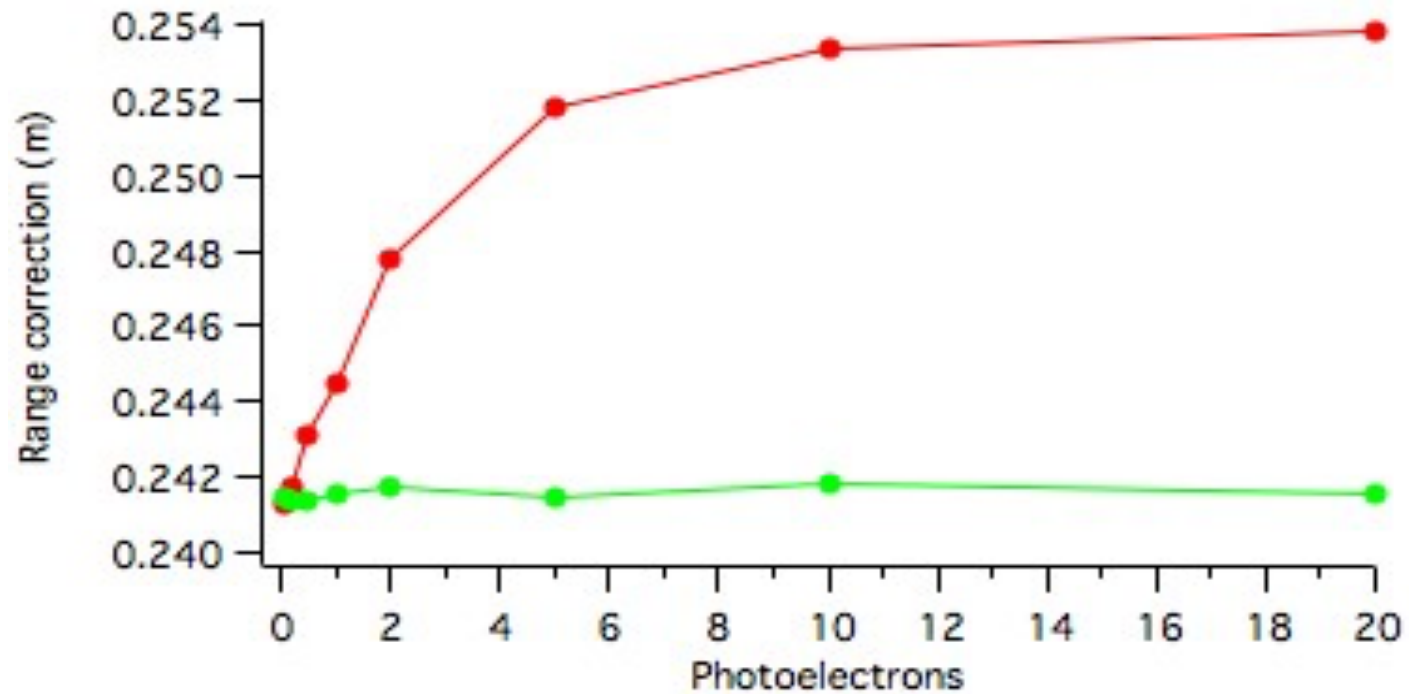- Red = halfmax, Green = Centroid

Range Correction vs number of photoelectrons
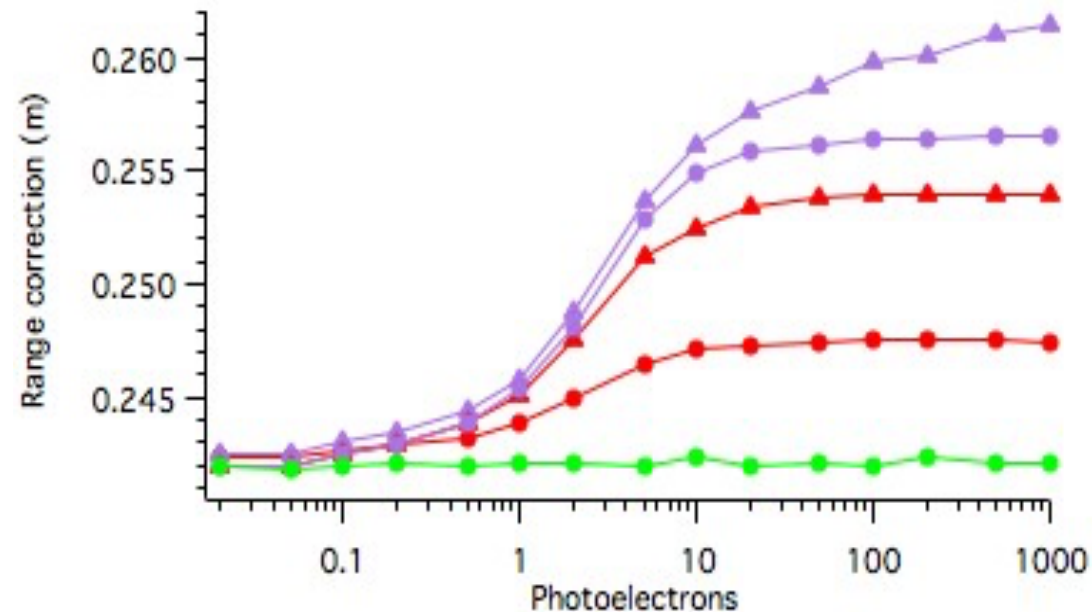
- Red = halfmax, Green = Centroid

Expanded plot

- Red = Halfmax, Green = centroid

Range correction for various detection systems

- Green = Centroid, Red circles = Halfmax (.3ns risetime), Red triangles = Halfmax(.03 ns rise time), Purple circles = first photoelectron (zero pulse length), purple triangles = first photoelectron (.03 ns risetime)

Target Calibration

- Green = Centroid, Red = Halfmax, Purple = first photoelectron
- Pulse .03 ns .30 ns
- Scale 6 mm 60 mm

Range corrections for the stations

- Blue = Theoretical Halfmax, Green = Centroid
- Red = stations (each dot may represent several overlapping stations)
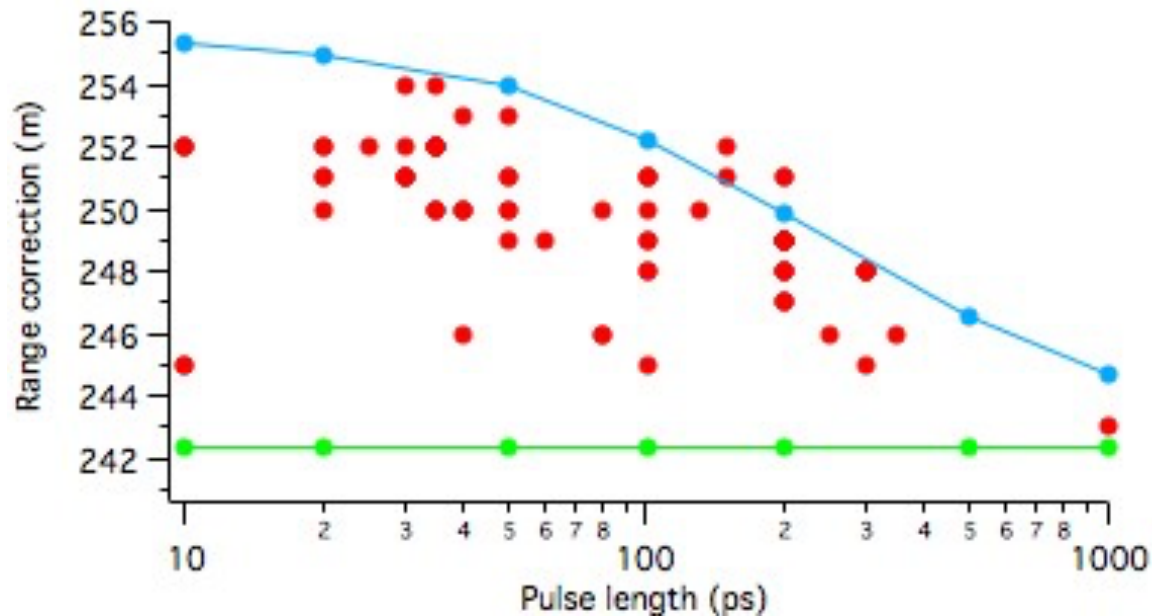
CSPAD Target Test

- Construct a target using the histogram for LAGEOS that will reproduce the return pulse from LAGEOS

- Use attenuation to get a return rate around %10. This is a signal strength of .1 pe

- Decrease the attenuation in convenient steps up to perhaps 1000 pe

- Plot the range correction vs number of photoelectrons.