Nano-particle analysis using dwell times between 10µs and 70µs with an upper counting limit of greater than $3x10^7$ cps and a gold nanoparticle detection limit of less than 10nm diameter. (Supplementary data).

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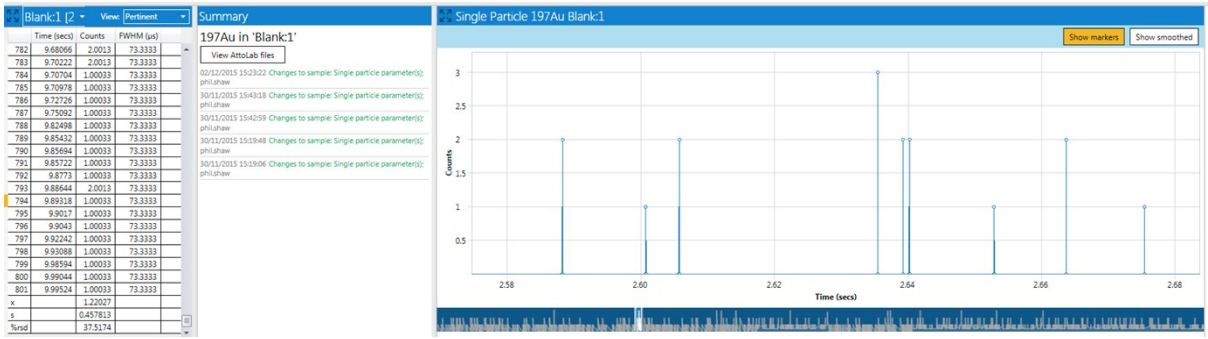
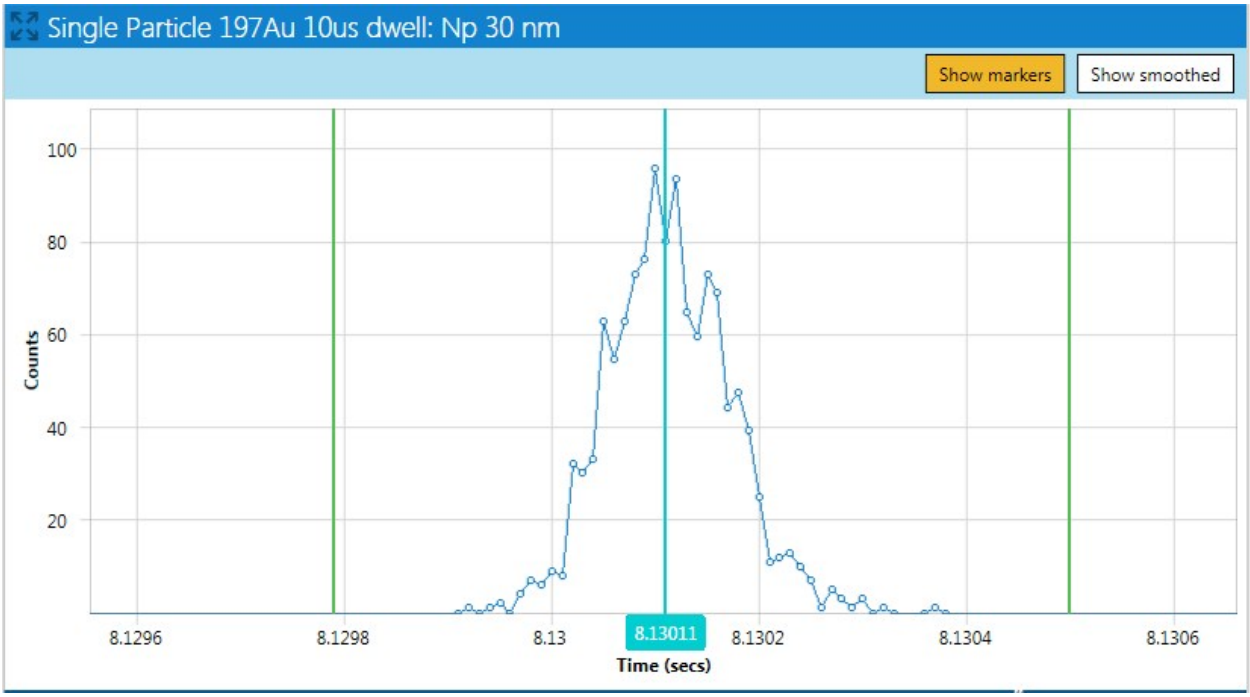
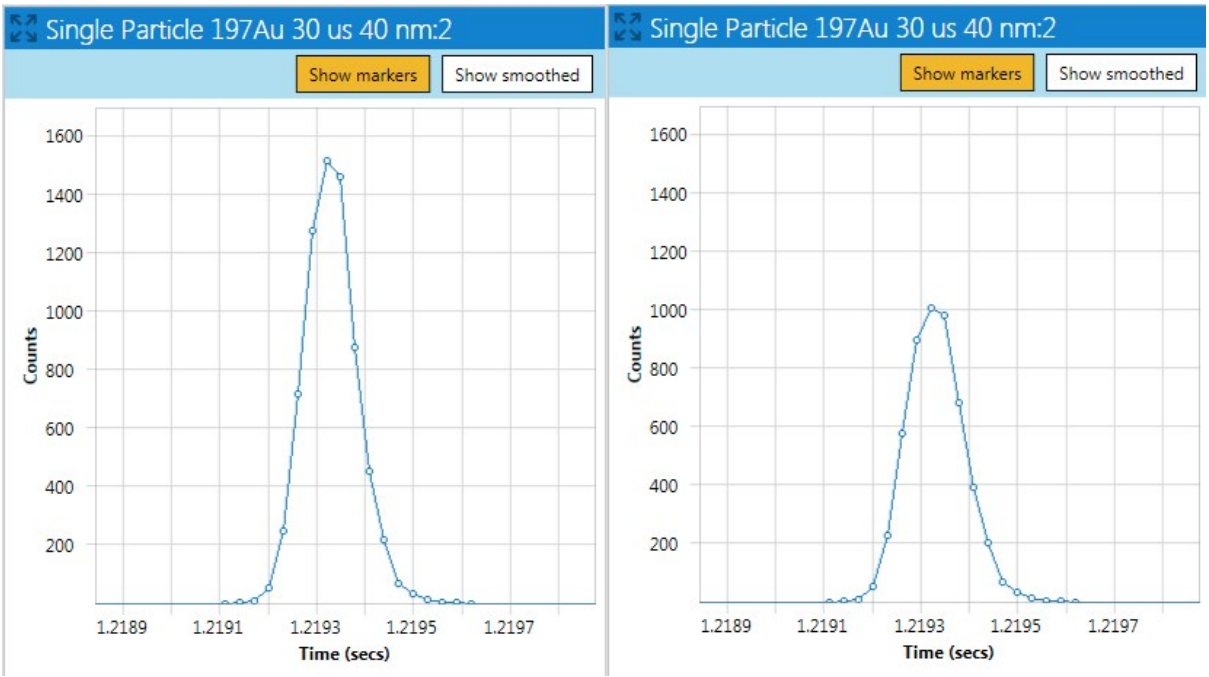
Supplemental data:



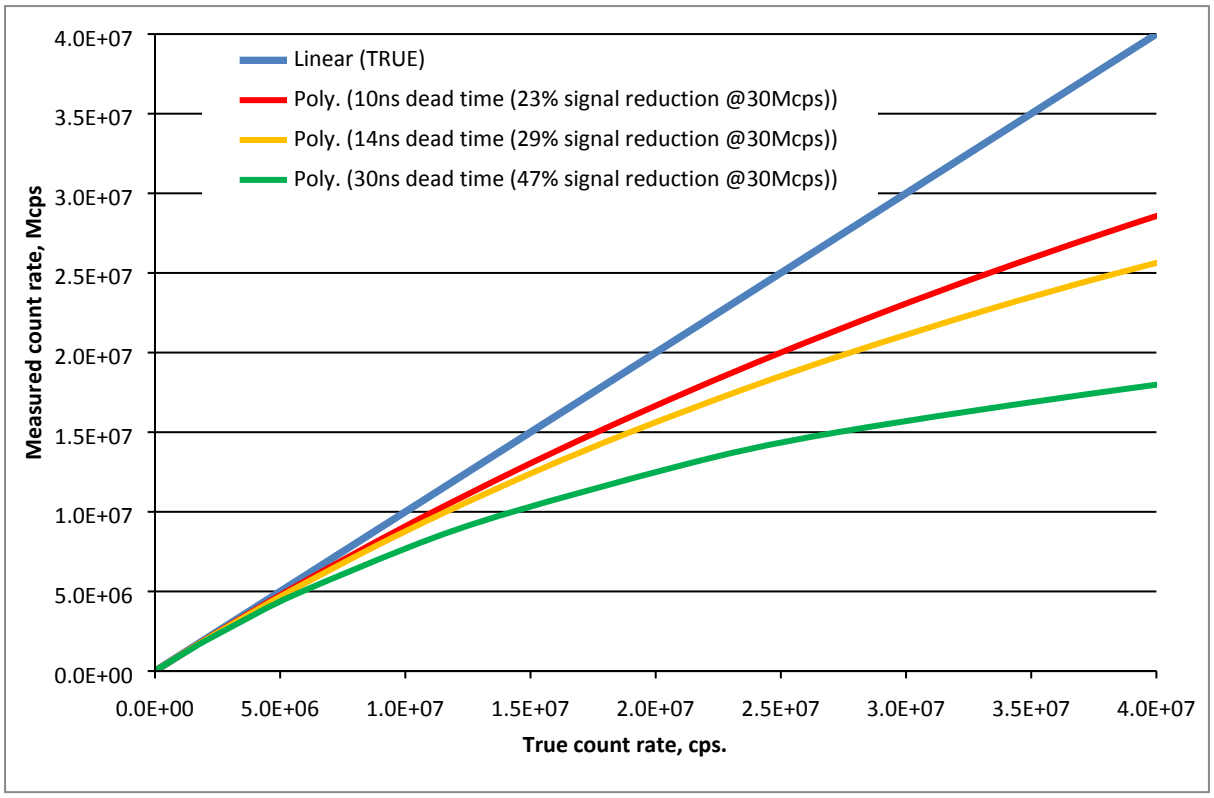
SI-Figure 1: Shows the signal seen from a blank, in 10 seconds there were 801 events of average 1.22 counts leading to a background of 97cps (or blank equivalent concentration of 0.16ppt). Data was acquired at 10µs dwell with a sensitivity of 0.05 counts/nm^3. This would make a peak of 4 counts (the threshold of when a signal is definitely not part of the background) equivalent to a particle of 80nm^3 volume or 5.3nm diameter.



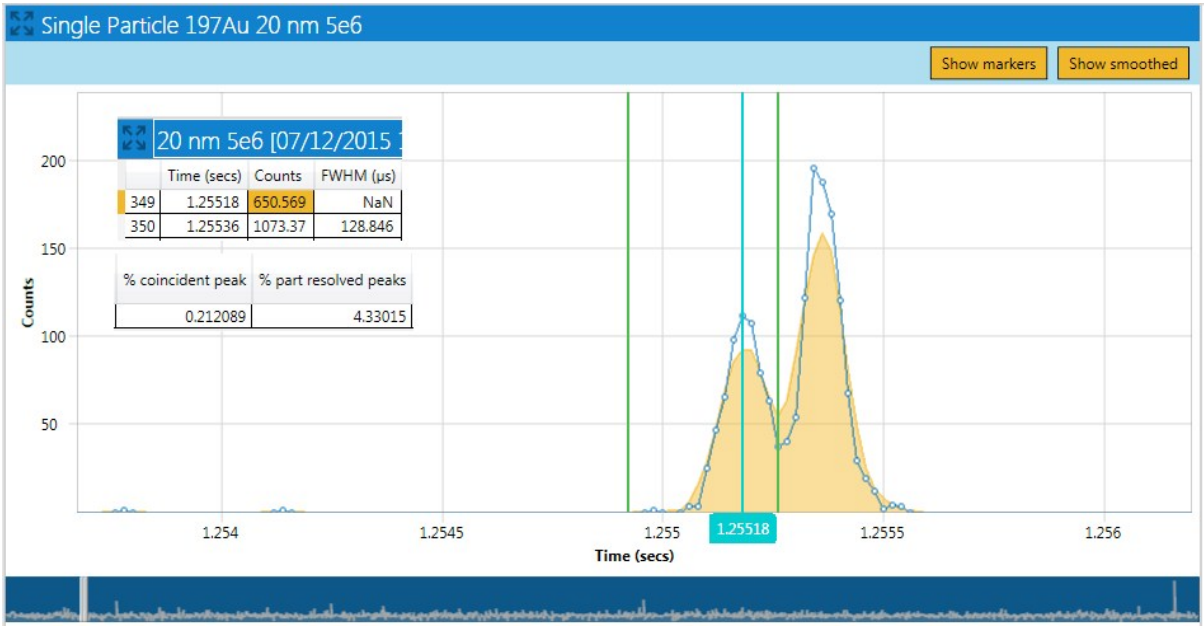
SI-Figure 2: The ion count profile of a single 30nm Au particle acquired with 10µs dwell. The integrated count was 1223 counts over a particle width of 400µs (Full Width Half Maximum 174µs).



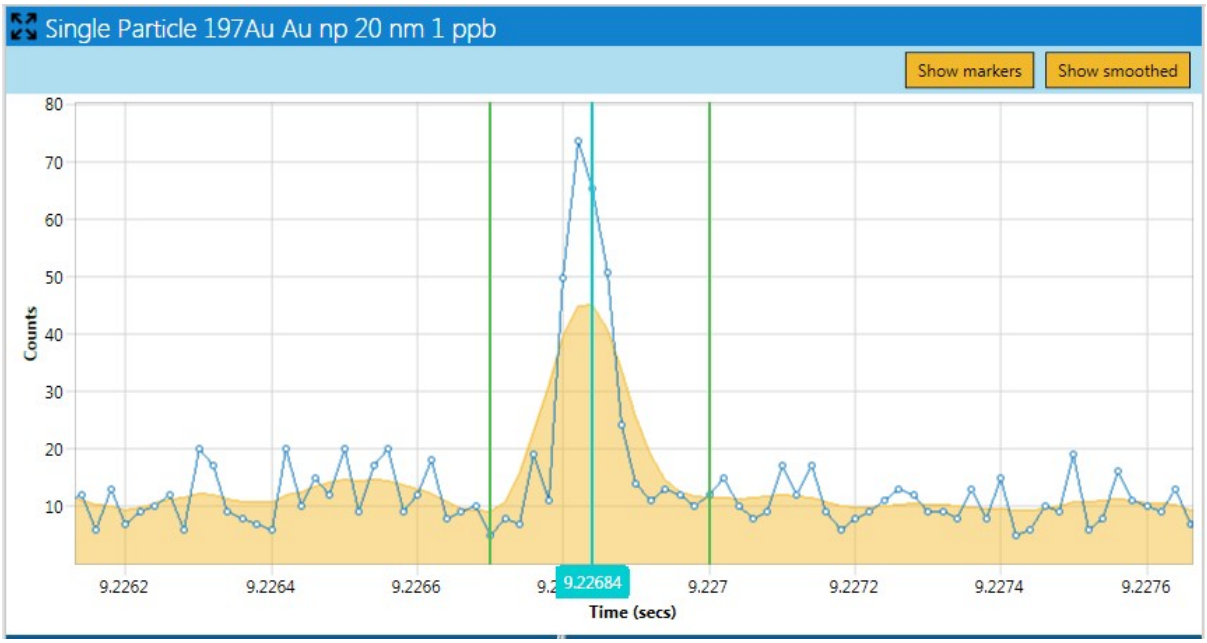
SI-Figure 3a and 3b: Shows the profile for a 40nm Au nanoparticle measured with 30µs dwell which has the equivalent of 50M cps at the peak maximum after 10ns dead time correction. The peak is also shown without dead time correction to indicate the level of correction that is accurately possible at this count rate with a low dead time detector.



SI-Figure 4: Showing the effect of having a shorter dead time on the level of signal correction required at higher count rates.



SI-Figure 5: Shows a partially overlapping pair of peaks from a 20nm standard with a particle concentration of $5x10^6$ mL^{-1} leading to ~270 measured particles per second which can still be accurately integrated using the variable peak width technique after automatic peak inflexion detection.



SI-Figure 6: Shows a 20nm gold particle in a 1ppb ionic gold solution measured with a dwell time of 20µs. The background has been processed with a 5 point 3 iteration rolling smooth, the particle start and end determined automatically and the background subtracted.