Optical Trap Calculations

Pixel to nm conversion for those doing image calculation of distances: 57.3 nm/pixel
Looking for a good program to count pixels? Try ImageJ (freeware).

Voltmeter (V) to laser power (mW)

Trap 1	Power [mW] = 295.36 * Voltmeter [V] – 7.6446
Trap 2 (closest to wall)	Power [mW] = 300.62 * Voltmeter [V] -9.3401

E.coli – Torque calculation. Note that you need two distances, as Torque (t) = trap stiffness (k) * displacement out of the trap (x) * lever arm length (d). You measured (or estimated) the lever arm length (between 1 and 3 microns probably), but you need a value for the displacement out of the trap, x. You can estimate x as 150 nm based on the characteristics of the trap size (I can explain in person).

Optical Trap Poster Presentations

I don't want to set absolute guidelines on your poster presentations, but the following are things I will be looking for:

1) Position calibration plot (nm vs V) with fit line (or lines)
2) Position calibration (nm/V units) vs laser power plot
3) Example figures for the stiffness calibration methods – no need to go overboard, either do an example laser power where you had good data or figure out a nice way to display the different laser powers on one graph (for example show decreasing variance with power for the equipartition measurements).
    a. power spectrum with roll off indicated
    b. displacement out of the trap vs velocity for stokes
4) A summary figure showing all three calibration methods with stiffness (pN/nm units) vs laser power.
5) Discussion about which calibration method(s) you think are most/least reliable and why. Indicate what calibration method(s) you selected for the *e.Coli* work.
6) Example figure for determining rotation speed of eColi
7) Example calculation of stall torque (show how you determined the lever arm distance)
8) Average speed and stall torque as well as histograms for buffer conditions you selected to evaluate
    a. For your data
    b. Pooled data from your classmates who used similar buffer conditions (everyone had the same starting buffer)
9) Brief discussion of *e.Coli* results
    a. Expected and observed behavior