Fig1a.csv contains all of the data used in producing figure 1a.

Wavelength is the wavelength of light in nm.

Cs polarizability is the calculated polarizability for Cs atoms in units a03 as a function of wavelength. a0 is the Bohr radius. Calculation includes the Cs core polarizability and the following Cs transitions:

Transitions used in Cs polarizability calculation:

|  |  |  |  |
| --- | --- | --- | --- |
| Transition | Wavelength (m) | A-coefficient (s^-1) | Weighting in calculation |
| 6s 2S1/2 -> 6p 2P1/2 | 894.59296 | 28620000 | 0.50 |
| 6s 2S1/2 -> 6p 2P3/2 | 852.3472759 | 32790000 | 1.50 |
| 6s 2S1/2 -> 7p 2P1/2 | 459.4459 | 793000 | 0.50 |
| 6s 2S1/2 -> 7p 2P3/2 | 455.6557 | 1840000 | 1.50 |
| 6s 2S1/2 -> 8p 2P1/2 | 388.9710415 | 89900 | 0.50 |
| 6s 2S1/2 -> 8p 2P3/2 | 387.72473 | 386000 | 1.50 |
| 6s 2S1/2 -> 9p 2P1/2 | 361.834 | 22300 | 0.50 |
| 6s 2S1/2 -> 9p 2P3/2 | 361.25014 | 143000 | 1.50 |
| 6s 2S1/2 -> 10p 2P1/2 | 348.1057 | 6330 | 0.50 |
| 6s 2S1/2 -> 10p 2P3/2 | 347.7805 | 62700 | 1.50 |
| 6s 2S1/2 -> 11p 2P1/2 | 340.0955 | 2360 | 0.50 |
| 6s 2S1/2 -> 11p 2P3/2 | 339.8941 | 36100 | 1.50 |

Wavelengths and A-coeffiecients are taken from:

J. Sansonetti, Wavelengths, transition probabilities, and energy levels for the spectra of Cesium (Cs I-Cs

LV), Journal of Physical and Chemical Reference Data **38**, 761 (2009).

Vacuum wavelengths are calculated from the differences in energy level given in the reference, given to within the uncertainty of the measured wavelengths for the same lines in the reference.

Cs core polarizability is taken to be **15.5**  , taken from:

W. R. Johnson, D. Kolb, and K.-N. Huang,, Electric-dipole, quadrupole, and magnetic-dipole susceptibilities and shielding factors for closed-shell ions of the He, Ne, Ar, Ni (Cu+), Kr, Pb, and Xe isoelectronic sequences,

At. Data Nucl. Data Tables **28**, 334 (1983).

Yb polarizability is the calculated polarizability for Yb atoms in units of a03 as a function of wavelength. Transitions used in Yb polarizability calculation:

|  |  |  |
| --- | --- | --- |
| Transition | Wavelength (nm) | A-coefficient (s^-1) |
| 4f14 6s2 1S0 -> 4f14 6s6p 3P1 | 555.80236 | 1150000 |
| 4f14 6s2 1S0 -> 4f14 6s6p 1P1 | 398.91142 | 192000000 |
| 4f14 6s2 1S0 -> 4f14 5d 6s2 (7/2,5/2)1 | 346.5362 | 68300000 |
| 4f14 6s2 1S0 -> 4f14 5d2 6s | 267.2754 | 14300000 |
| 4f14 6s2 1S0 -> 4f14 6s7p 1P1 | 246.5242 | 100000000 |

Wavelengths and A-coefficients are taken from the **NIST spectroscopic database**. Vacuum wavelengths are calculated from the differences in energy level given in the reference, given to within the uncertainty of the measured wavelengths for the same lines in the reference.

Yb core polarizability is assumed to be Zero.

Fig1b.csv contains all of the data used in producing figure 1b.

Displacement is transverse to the direction of beam propagation, and given in um.

Trap Depth – 532 nm only is the calculated trap depth for Cs atoms due to the potential formed by just the 532 nm beam, given in uK.

Trap Depth – 1070 nm only is the calculated trap depth for Cs atoms due to the potential formed by just the 1070 nm beam, given in uK.

Trap Depth – BODT is the calculated trap depth for Cs atoms due to the potential formed by the combined 532 nm and 1070 nm beams, given in uK.

For the purpose of this example the 532 nm beam has a 1/e^2 beam waist of 50 um, and a beam power of 1 W. The 1070 nm beam has a 1/e^2 beam waist of 50 um, and a beam power of 0.5 W.

Fig1c.csv contains all of the data used in producing figure 1c.

Displacement is transverse to the direction of beam propagation, and given in um.

Trap Depth – 532 nm only is the calculated trap depth for Yb atoms due to the potential formed by just the 532 nm beam, given in uK.

Trap Depth – 1070 nm only is the calculated trap depth for Yb atoms due to the potential formed by just the 1070 nm beam, given in uK.

Trap Depth – BODT is the calculated trap depth for Yb atoms due to the potential formed by the combined 532 nm and 1070 nm beams, given in uK.

For the purpose of this example the 532 nm beam has a 1/e^2 beam waist of 50 um, and a beam power of 1 W. The 1070 nm beam has a 1/e^2 beam waist of 50 um, and a beam power of 0.5 W.