FIG. 3. Spectrum of sidebands due to two-ion $x$-axis normal mode motion: (from left to right) lower stretch, lower COM, upper COM, and upper stretch. The ordinate is the detuning of the Raman probe beam difference frequency from the carrier transition. The abscissa shows the ion fluorescence (proportional to the expectation value of the number of atoms in the state $|\downarrow\rangle$), plus a constant background (whose approximate level for the lower curves is indicated by the dashed line). The solid lines, meant as guides to the eye, are fits to Gaussians. The lower traces show the effects of Doppler cooling. The upper traces, offset vertically for clarity, show the effects of several pulses of Raman cooling on the mode which is displayed. Vanishing lower motional sidebands indicate cooling to the ground state of motion. The peak widths are consistent with the Raman probe pulse lengths ($\approx 3$ $\mu$s).

The plot to the left is from one of D.J. Wineland's seminal papers on the laser cooling of trapped ions to their motional ground states: **Cooling the Collective Motion of Trapped Ions to Initialize a Quantum Register.** D. J. Wineland et. al. Phys. Rev. Lett. **81**, 1525 – Published 17 August 1998.

The story being told here is of the effectiveness of sideband cooling in bringing two ions down to their collective motional ground state in both of their normal modes -- which surpasses the Doppler limit.

The plot does a good job of concisely illustrating the result. The lower plots show the spectra (for both red and blue sidebands of both modes) after Doppler cooling. And the upper plots show the same spectra after a several sequences of sideband cooling. The absence of the fluorescence dips in the red sideband spectra and the enhancement of these dips in the blue spectra are indicative of ground state cooling.

One thing that could have been done better in this plot is the inclusion of more caption information in the actual plot. For example, color coding the different spectra and providing a legend indicating COM/stretch modes would be an easy addition that would go a long way in making the plot more self-contained. Additionally a red/blue colorscheme might have further clarified the distinction between the red/blue sidebands (although, the x-axis is already sufficient for this). Another thing that could have been changed would be to reduce the prominence of the Gaussian fits (which really don't provide any necessary information) by using narrower linewidths, dashing or perhaps a reduced opacity.

Finally, the dashed line at the bottom indicating the dark current could arguably be removed since its exact value doesn't affect the comparison between the lower and upper plots.