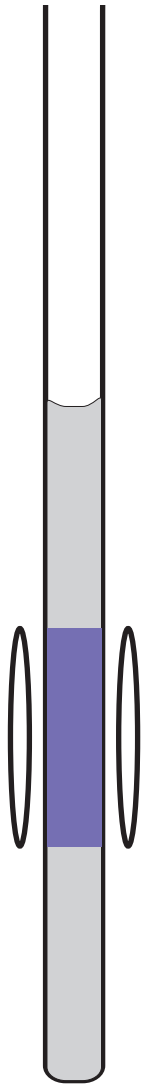
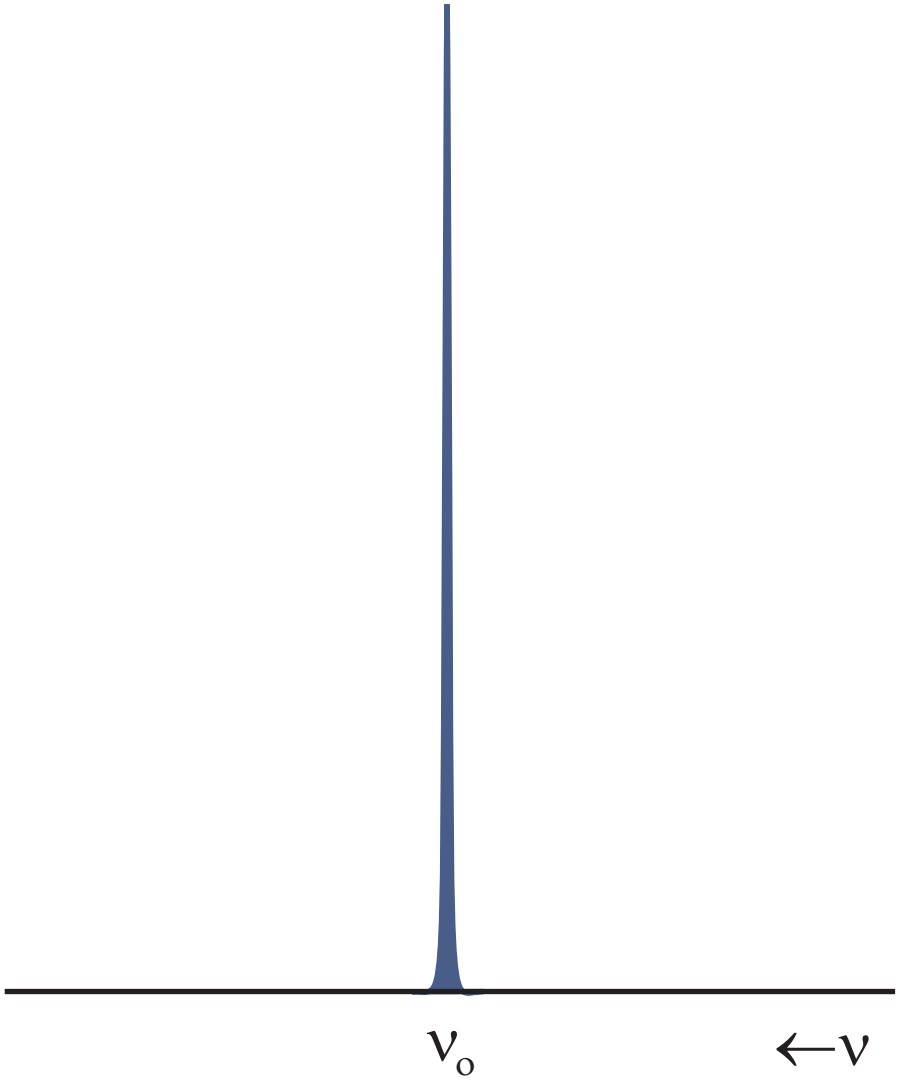
Typically NMR Sample Configuration

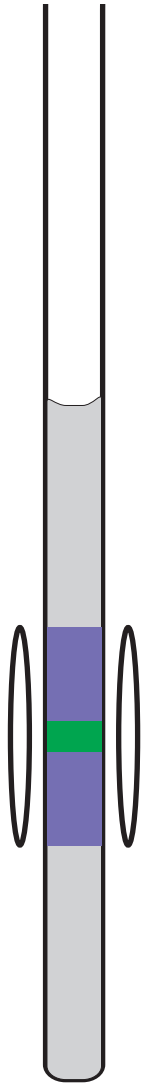


$\nu_o = \gamma B_o$

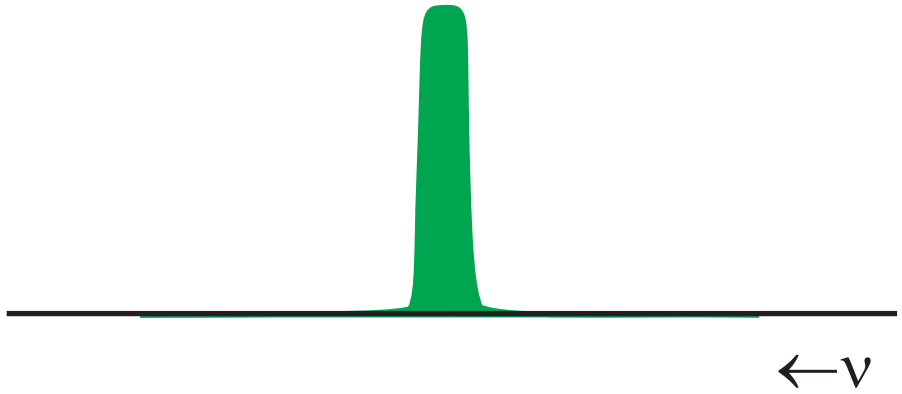
Solvent column ~ 3× as long as detection region.



Z1 Gradient Effects on NMR Line Shapes



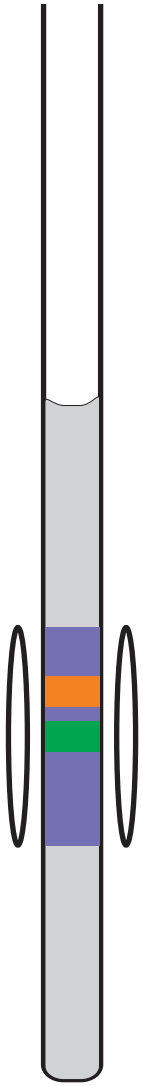
If the magnetic field varies roughly in a linear manner, from smaller to larger from bottom to top of the tube, the following will be approx. correct:



$\nu_o = \gamma B_o$

In a thin slice at the middle of the detection region, the field ~B_o.

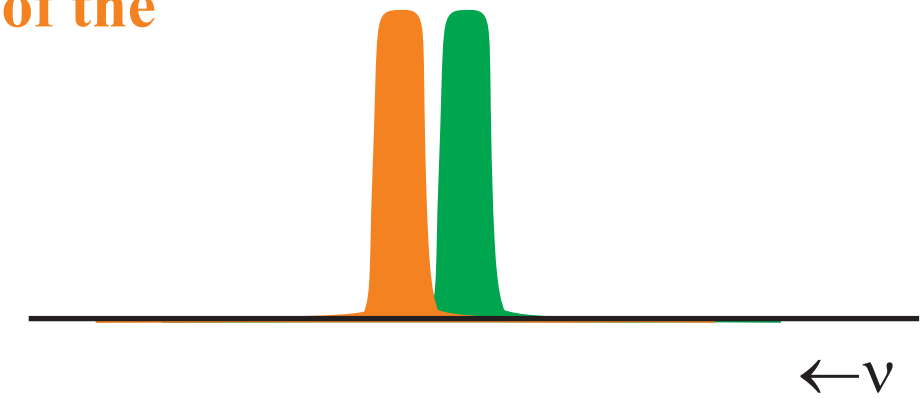
Z1 Gradient Effects on NMR Line Shapes



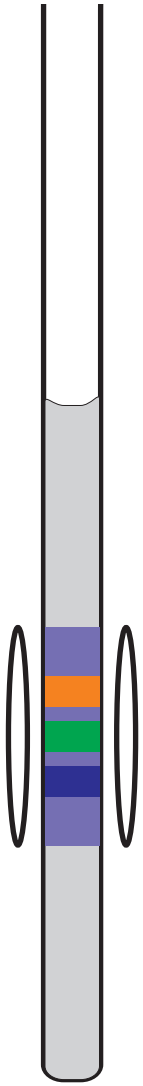
A slice slightly higher would be shifted to higher field, increasing the observed ν from this region of the sample.

$\nu_o = \gamma B_o + \Delta z \gamma G_z$

$\nu_o = \gamma B_o$



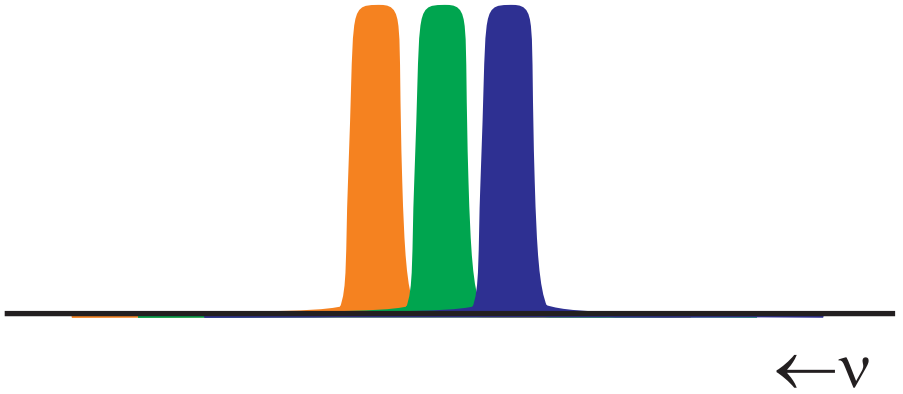
Z1 Gradient Effects on NMR Line Shapes



$\nu_o = \gamma B_o + \Delta z \gamma G_z$

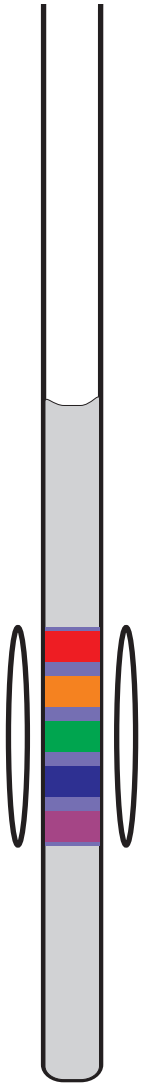
$\nu_o = \gamma B_o$

$\nu_o = \gamma B_o - \Delta z \gamma G_z$



A slice closer to the bottom is shifted to lower frequency.

Z1 Gradient Effects on NMR Line Shapes



Slices twice as far from the center are moved linearly out in frequency by a Z1 magnetic field gradient.

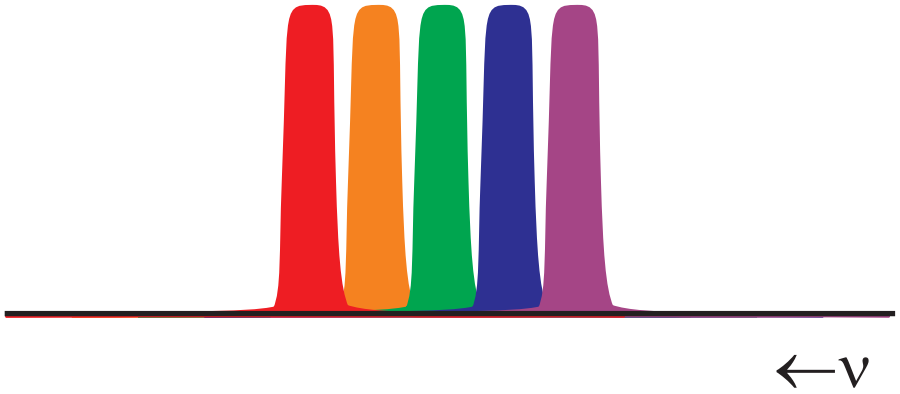
$$\nu_o = \gamma B_o + 2\Delta z \gamma G_z$$

$$\nu_o = \gamma B_o + \Delta z \gamma G_z$$

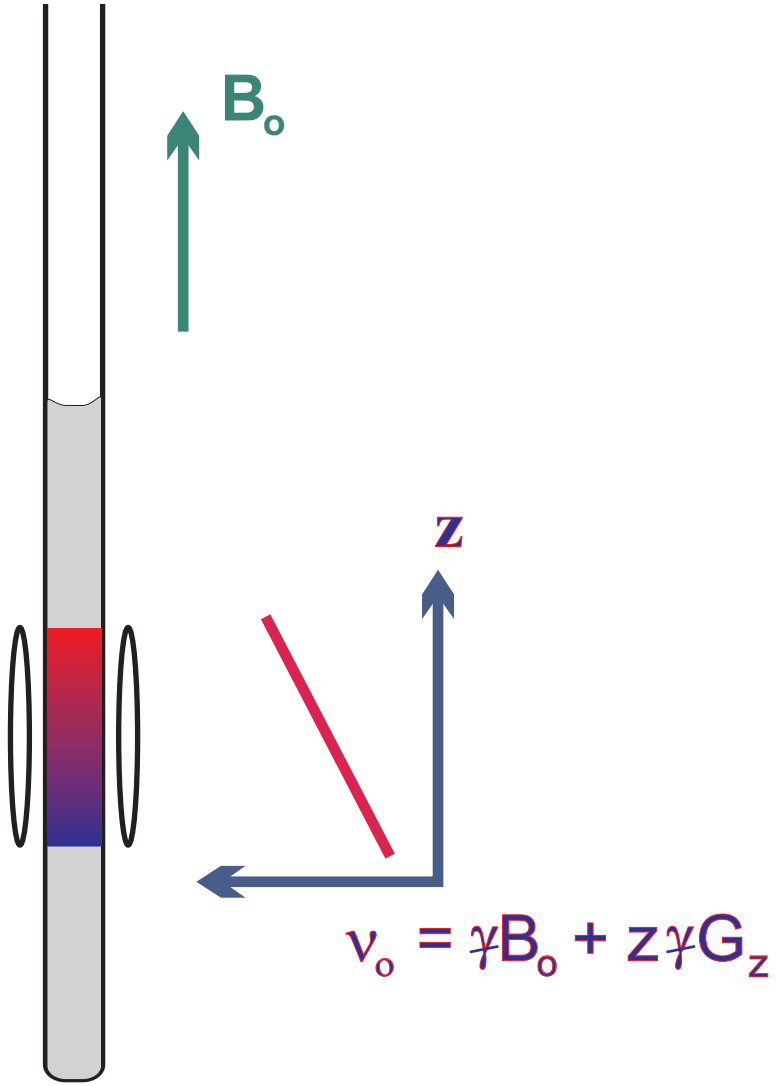
$$\nu_o = \gamma B_o$$

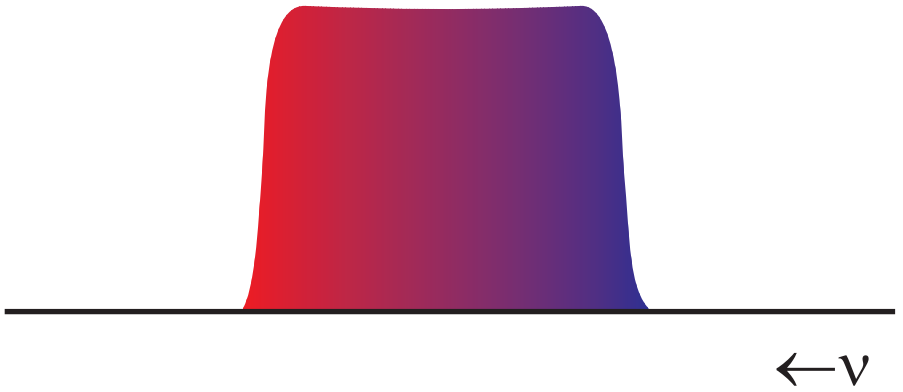
$$\nu_o = \gamma B_o - \Delta z \gamma G_z$$

$$\nu_o = \gamma B_o - 2\Delta z \gamma G_z$$

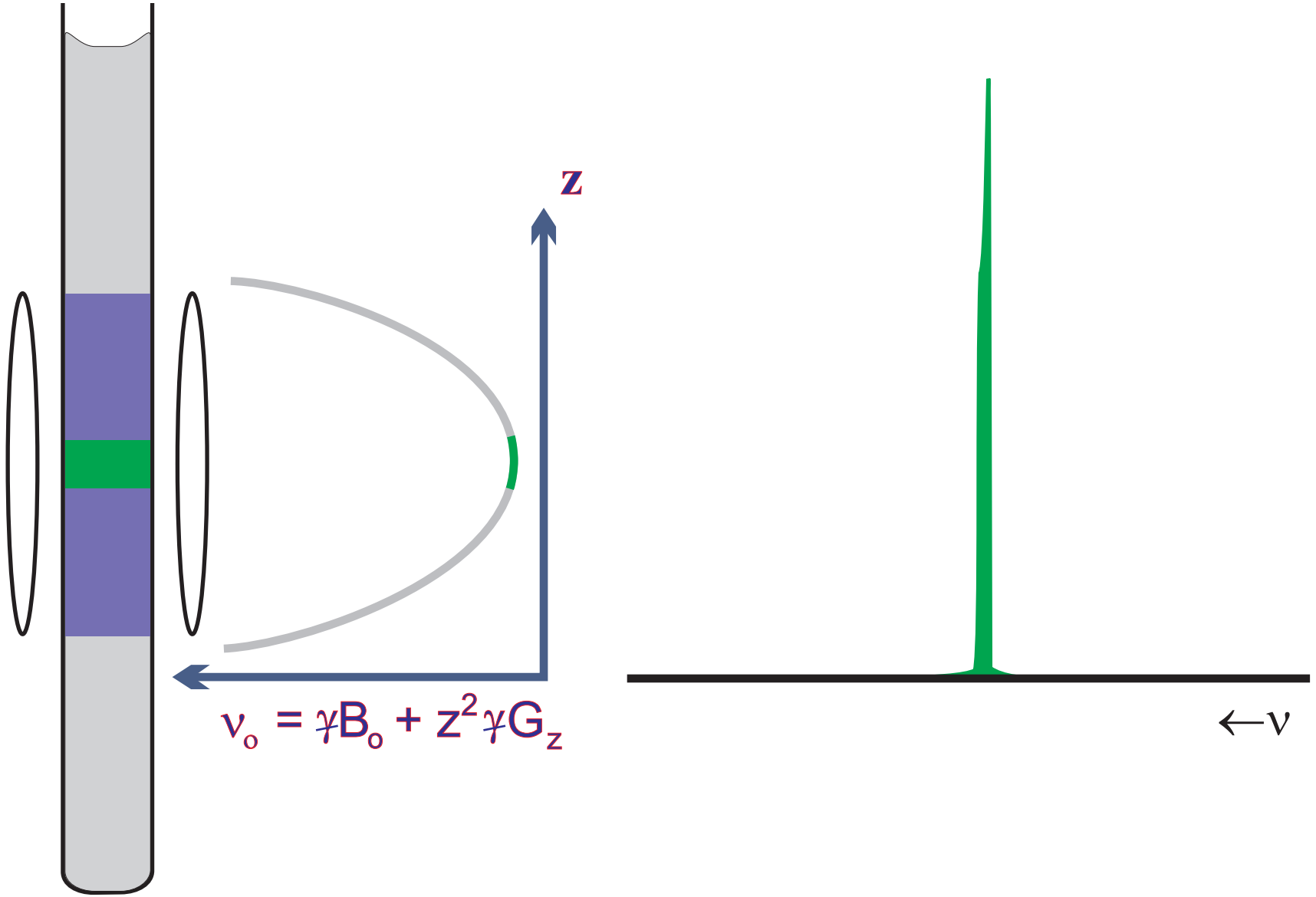


Z1 Gradient Effects on NMR Line Shapes

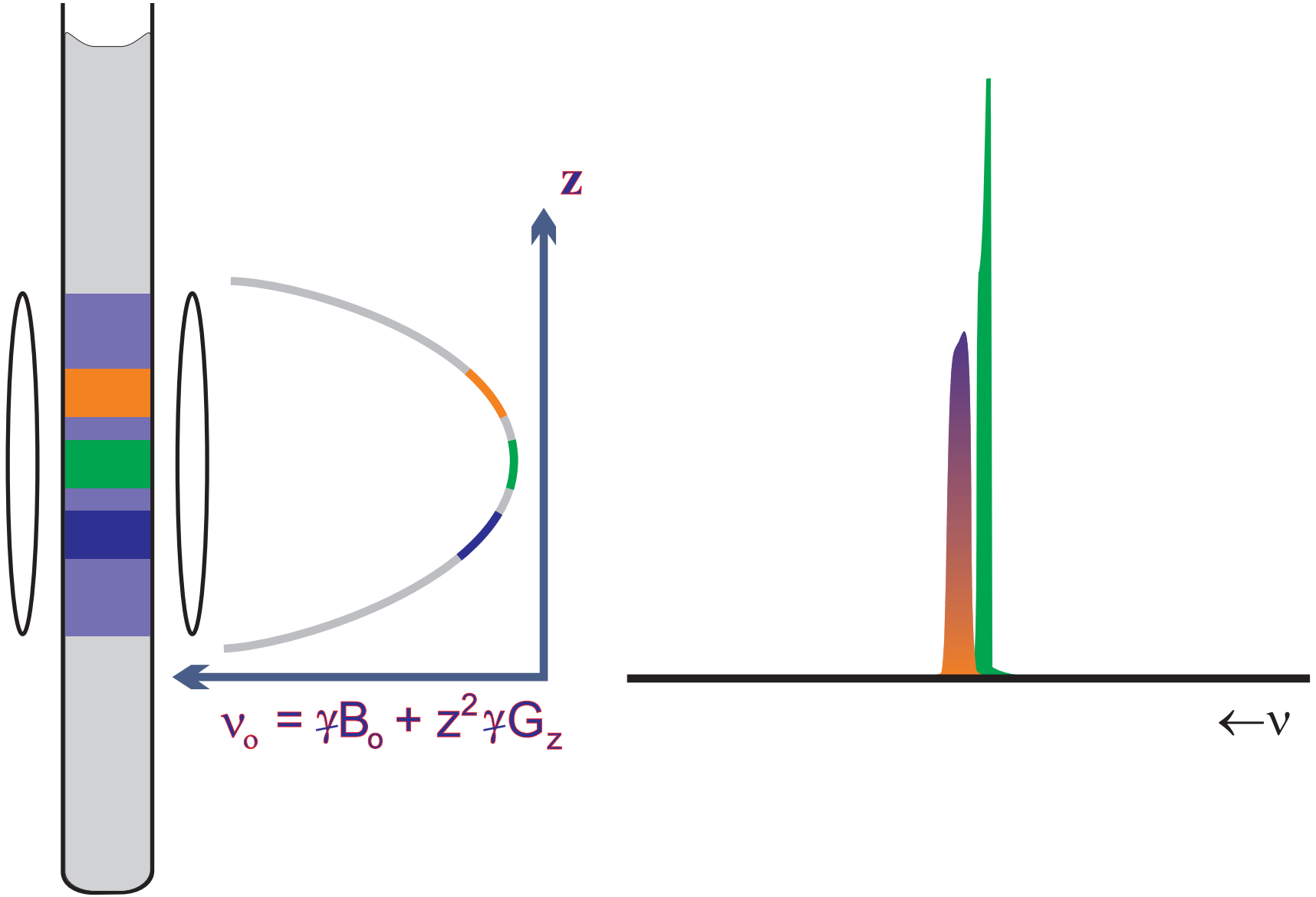




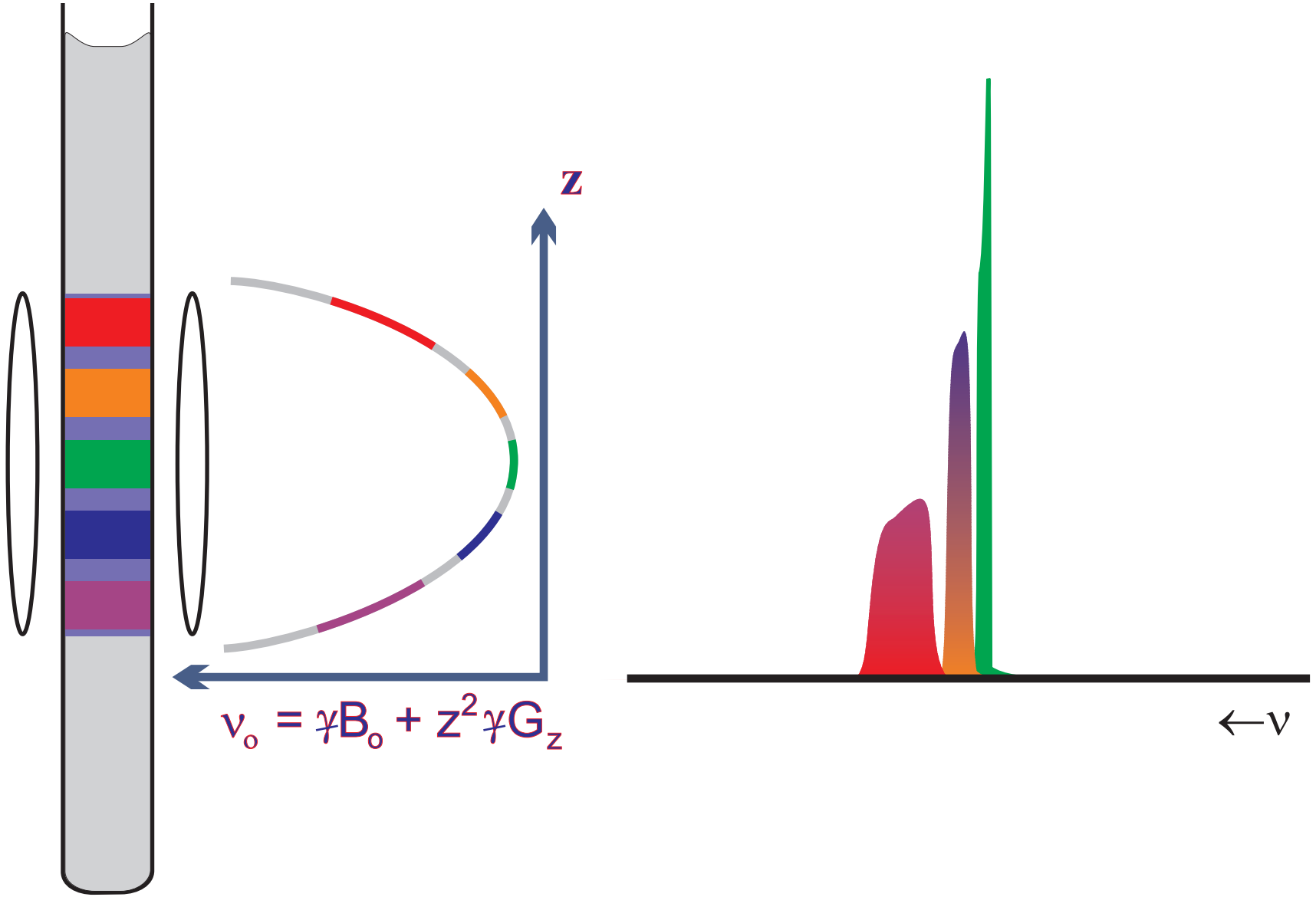
Z2 Gradient Effects on NMR Line Shapes



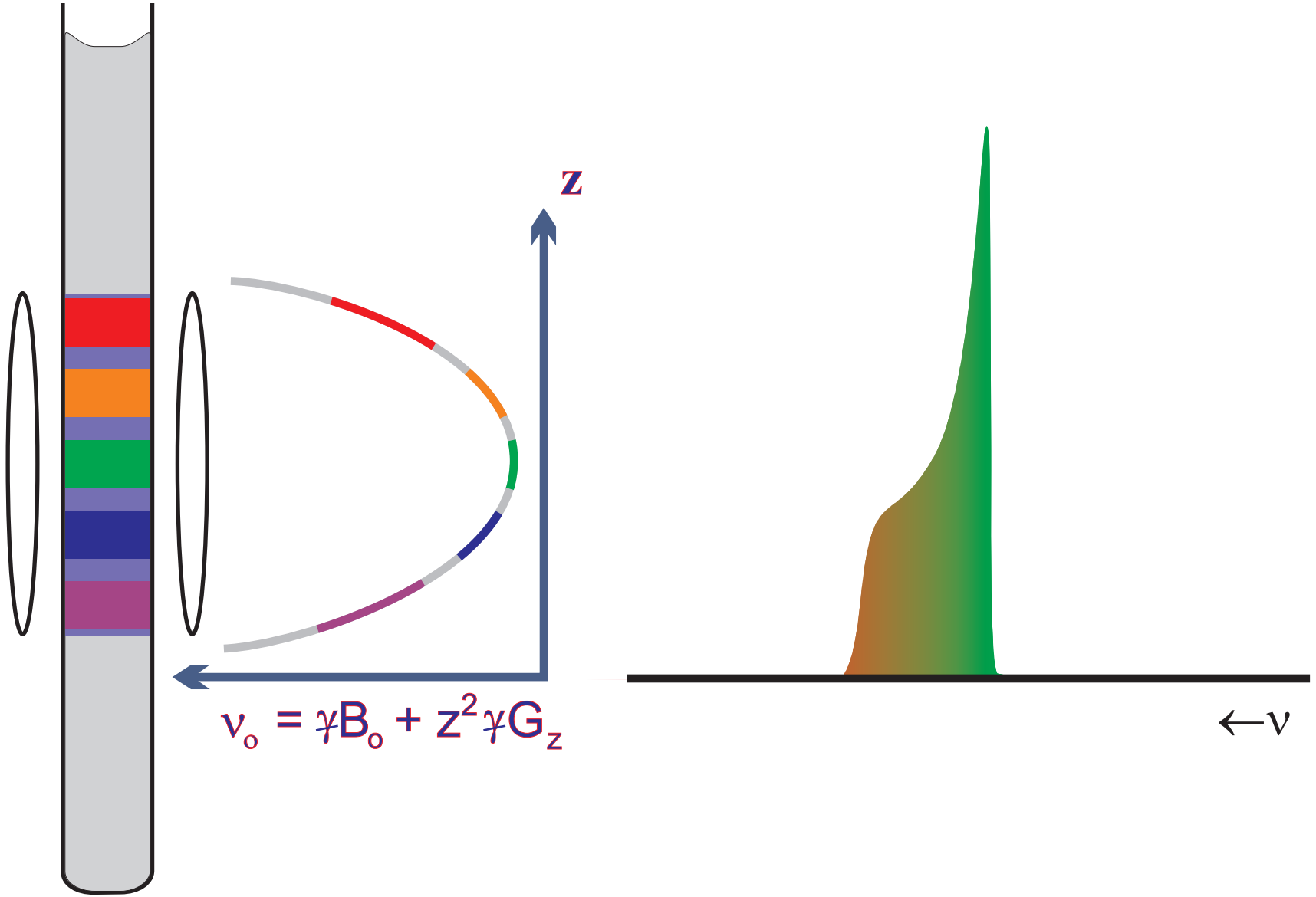
Z2 Gradient Effects on NMR Line Shapes



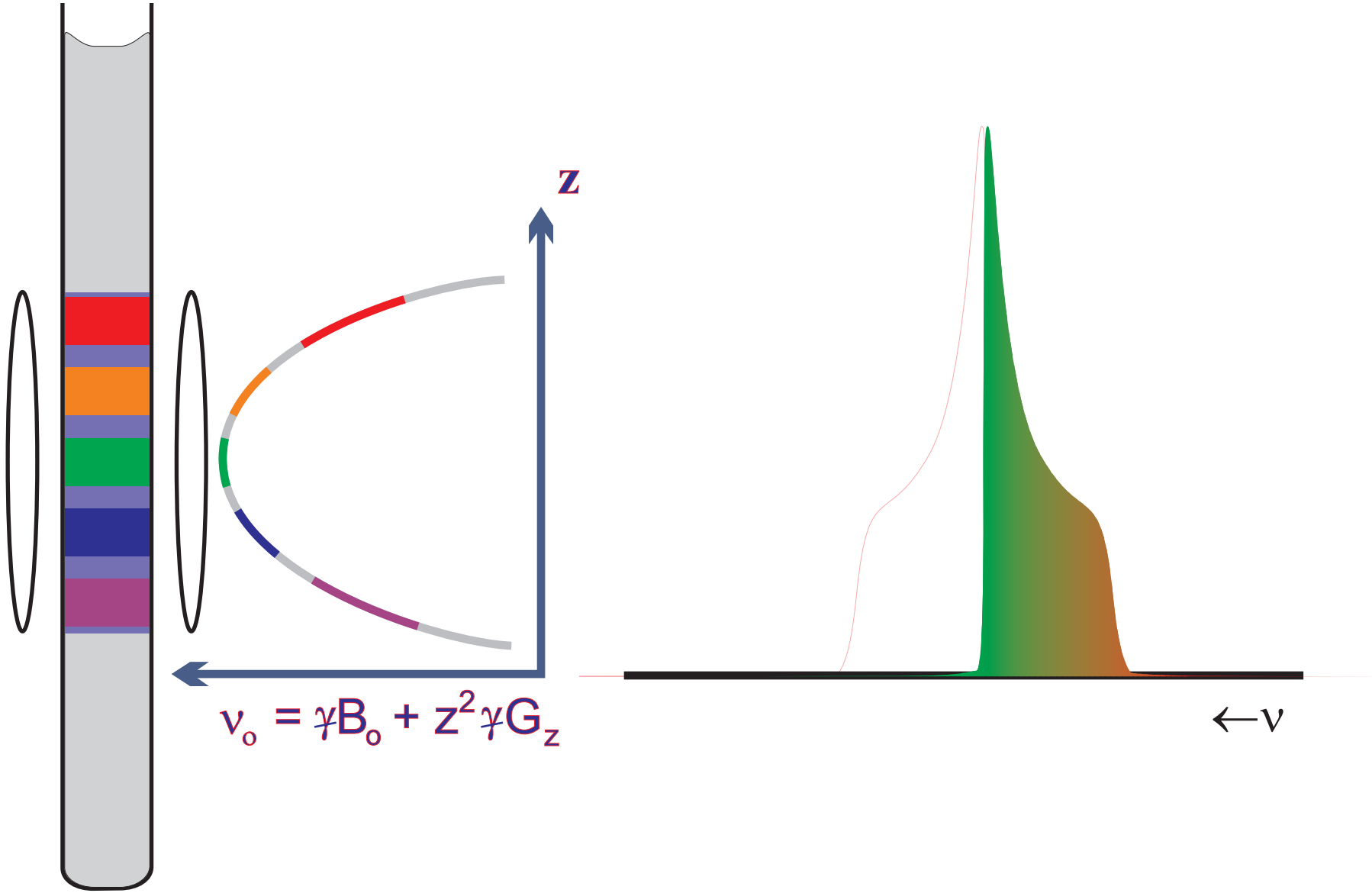
Z2 Gradient Effects on NMR Line Shapes



Z2 Gradient Effects on NMR Line Shapes



Z2 Gradient Effects on NMR Line Shapes



Z3 Gradient Effects on NMR Line Shapes