VECTOR INTERPRETATION OF TWO-ELECTRON SPIN EIGENFUNCTIONS

I.	M_S	S
$^3\Gamma_1(\sigma_1,\sigma_2) = \alpha(\sigma_1)\alpha(\sigma_2)$	+1	1
$^3\Gamma_0(\sigma_1,\sigma_2) = \frac{1}{\sqrt{2}}[\alpha(\sigma_1)\beta(\sigma_2) + \beta(\sigma_1)\alpha(\sigma_2)]$	0	1
$^3\Gamma_{-1}(\sigma_1,\sigma_2) = \beta(\sigma_1)\beta(\sigma_2)$	–1	1
$^1\Gamma_0(\sigma_1,\sigma_2) = \frac{1}{\sqrt{2}}[\alpha(\sigma_1)\beta(\sigma_2) - \beta(\sigma_1)\alpha(\sigma_2)]$	0	0

II. $\hat{S}^2\,\Gamma = S(S+1)\hbar^2\Gamma$ $\qquad$ $\hat{S}_z\Gamma = M_S\hbar\Gamma$

$\hat{S}_z\Gamma = (m_{s1} + m_{s2})\hbar\Gamma$

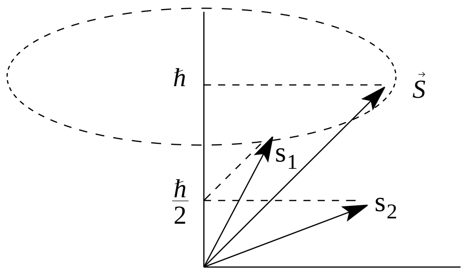
III. $\hat{S}^2\ {}^3\Gamma_{(1,0,-1)} = (1)(1+1)\hbar^2\ {}^3\Gamma_{(1,0,-1)} = (2\hbar^2)\ {}^3\Gamma_{(1,0,-1)}$

$$\hat{S}_z\,{}^3\Gamma_{(1,0,-1)} = \begin{pmatrix}1\\0\\-1\end{pmatrix}\hbar\ \ {}^3\Gamma_{(1,0,-1)}$$

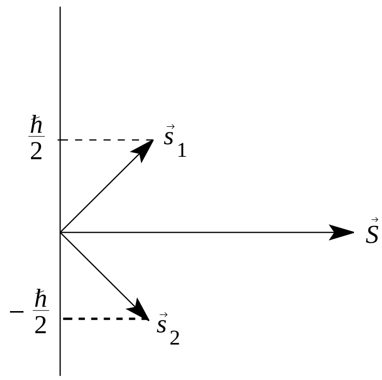
$$\hat{S}^2\ \ {}^1\Gamma_0 = 0(0+1)\hbar^2\ \ {}^3\Gamma_{(1,0,-1)}$$

$$\hat{S}_z\,{}^1\Gamma_0 = 0\hbar\ {}^1\Gamma_0 = 0$$

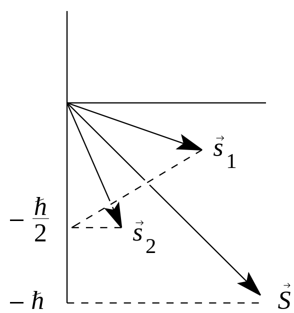
IV. For $^3\Gamma$ one has combined the spins of two spin $\frac{1}{2}$ electrons to get a spin vector of net magnitude $\sqrt{2}\hbar$ and z direction either $\hbar$, 0, $-\hbar$.



$$^3\Gamma_1 = \alpha(1)\alpha(2)$$

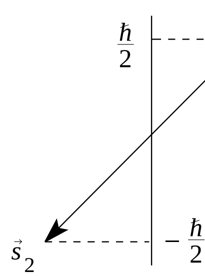


$$^3\Gamma_0 = \frac{1}{\sqrt{2}}\left[\alpha(1)\beta(2) + \beta(1)\alpha(2)\right]$$



$$^3\Gamma_{-1} = \beta(1)\beta(2)$$

V. For $^1\Gamma$ one has combined the spins of two electrons to get a zero resultant spin.



$$^1\Gamma_0 = \frac{1}{\sqrt{2}}\left[\alpha(1)\beta(2) - \beta(1)\alpha(2)\right]$$