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Erratum

A Finite Sum Representation of the Angular Momentum Projection Operator

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The right hand sides of Eqs. (2.12), (2.17) and (3.2) should be multiplied by $\frac{1}{(2M+1)^3}$, $\frac{1}{(M+1)^2(2M+1)}$ and $\frac{1}{(2M+1)}$ respectively. Similarly a factor of $\frac{1}{(M+1)}$ is missing from the r.h.s. of Eqs. (3.6) and (3.10). In Eq. (2.17) the factor $e^{-i\beta'_0 l \hat{J}_y}$ should be replaced by $e^{-i\beta_0 l \hat{J}_y}$ and the expression of $A_{KK'}^{nln'}(J,\beta_0)$ appropriately modified.
In (A.9) the phase factor is $(-1)^{K-K'}$ instead of $(-i)^{K-K'}$. The power of $(\cos\frac{1}{2}\beta)$ in (A.15) is $(K+K')$.
The part between (A.10) and (A.14) in the Appendix should read as follows:
The integrals are different depending on whether $(l-m)$ is odd or even. Denoting by $I_{KK'}^{0}(J,m)$ and $I_{KK'}^{E}(J,m)$ the parts of the sum such that $(l-m)$ is odd and even respectively one has

$$I_{KK'}^{0}(J,m)=\sum_{l=0}^{J}{}' \frac{(-i)^{K-K'} d_{lK'}^{J}(\frac{1}{2}\pi)\, d_{lK}^{J}(\frac{1}{2}\pi)}{2i} [\delta_{l,m-1}-\delta_{l,m+1}]\,\pi$$
$$=\frac{\pi}{2i}(-i)^{K-K'}[d_{m-1,K'}^{J}(\tfrac{1}{2}\pi)\, d_{m-1,K}^{J}(\tfrac{1}{2}\pi) - d_{m+1,K'}^{J}(\tfrac{1}{2}\pi)\, d_{m+1,K}^{J}(\tfrac{1}{2}\pi)]. \tag{A.11}$$

and

$$I_{KK'}^{E}(J,m)=-2(-i)^{K-K'}\sum_{l=0}^{J}{}'' \frac{d_{lK'}^{J}(\frac{1}{2}\pi)\, d_{lK}^{J}(\frac{1}{2}\pi)}{(l-m)^2-1} \tag{A.12}$$

where $\sum'$ and $\sum''$ indicate the appropriate restrictions on the summation. One can show that the real part of $I_{KK'}(J,m)$

$$I_{KK'}^{R}(J,m)=0 \quad |m|<(J-K_1) \tag{A.13}$$

where K_1 is the greater of K and K'. Thus since the d-functions are real it follows from (A.1) that

$$I_{KK'}^{R}(J,m)=\int_{-1}^{+1} d(\cos\beta)\, d_{KK'}^{J}(\beta)\cos m\beta \tag{A.14}$$

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