QM-17 Lecture Notes

Summary of main results on addition of angular momenta

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The allowed values of J, M in the state $|j_1 m_1\rangle|j_2 m_2\rangle$ are restricted by the following constraints.

1. The z-component of the total angular momentum, M, is restricted by $M = m_1 + m_2$
2. The total angular momentum J^2 can take $J(J+1)\hbar^2$, where the minimum value of J is $|j_1 - j_2|$ and the maximum value is $j_1 + j_2$.
3. The allowed values of J are *all values in the range* $|j_1 - j_2|$ to $j_1 + j_2$ *in steps of unity.*
4. Each combination of J, M appears only once, no pair (J, m) of values of J and M gets repeated.

The above statements are equivalent to saying that the Clebsch Gordon coefficients are zero when any one of the above conditions is not satisfied. *In addition one must remember the angular momentum results that value of M must always be between $-J$ and J, and J must be positive.*

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