

PHYSICS 220 : GROUP THEORY
PROBLEM SET #3

- [1] Construct homogeneous polynomial basis functions of the lowest order for all C_{4v} IRREPs.
- [2] Is C_{4v} simply reducible? Why or why not? If yes, construct all its CGCs.
- [3] Find all the SU(2) CGCs for $\frac{1}{2} \otimes 1 = \frac{1}{2} \oplus \frac{3}{2}$.
- [4] By applying the raising and lowering operators, show that the SU(2) CGCs satisfy a recursion relation relating $\begin{pmatrix} j_1 & j_2 & | & j \\ m_1 & m_2 & | & m \pm 1 \end{pmatrix}$, $\begin{pmatrix} j_1 & j_2 & | & j \\ m_1 \mp 1 & m_2 & | & m \end{pmatrix}$, and $\begin{pmatrix} j_1 & j_2 & | & j \\ m_1 & m_2 \mp 1 & | & m \end{pmatrix}$.