Applications of Group Theory

Lectures	Tue	10:00 - 11:30	PHY 9.1.09
	Thu	10:00 - 11:30	PHY 9.1.09
Exercises	Fri	10:00 - 11:30	PHY 5.0.21

Sheet 9

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1. Character tables of double groups

1. Consider the group D_4 and find the classes of the associated double group $\bar{D}_4$ (Hint: make use of the Opechowski's rules)
2. Which is the number of irreducible spinor representations in $\bar{D}_4$?
3. Complete now the character table of the double group $\bar{D}_4$ by adding to it the characters associated to the spinorial representations.

2. Geometry of rotations

1. Prove that all the C_3 operations of the octahedral group O (group of the cube) are conjugate, but that this is not so for the T group (group of the tetrahedron). Discuss the corresponding classes in these groups. Hint: make use of the concept of pole.
2. Prove that
$$R(\lambda;\mathbf{\Lambda})\mathbf{r} = (1-2\Lambda^2)\mathbf{r} + 2\lambda(\mathbf{\Lambda}\times\mathbf{r}) + 2(\mathbf{\Lambda}\cdot\mathbf{r})\mathbf{\Lambda}$$
where $R(\lambda;\mathbf{\Lambda})$ is a rotation in terms of the Euler-Rodrigues parameters and $\mathbf{r}$ is a generic space vector.

Frohes Schaffen!