Applications of Group Theory

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Lectures	H33, Mondays, 14:15
	H34, Thursdays, 14:15
Exercises	5.0.21, Wednesdays, 13:15

Sheet 10

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
$$R(\lambda; \boldsymbol{\Lambda})\mathbf{r} = (1 - 2\Lambda^2)\mathbf{r} + 2\lambda(\boldsymbol{\Lambda} \times \mathbf{r}) + 2(\boldsymbol{\Lambda} \cdot \mathbf{r})\boldsymbol{\Lambda}$$

where $R(\lambda; \boldsymbol{\Lambda})$ is a rotation in terms of the Euler-Rodrigues parameters and $\mathbf{r}$ is a generic space vector.

Frohes Schaffen!