

## Symmetry Groups in Physics: Problems

### Problem 25 — Reducibility and equivalence of linear representations

A representation  $D : G \rightarrow GL(V)$  is given and equivalent with a representation  $D' : G \rightarrow GL(V')$ . Show the following propositions!

- (i) If  $D$  is reducible,  $D'$  is reducible.
- (ii) If  $D$  is irreducible,  $D'$  is irreducible.
- (iii) If  $D$  is completely reducible,  $D'$  is completely reducible.

### Problem 26 — One-dimensional representations

- a) Show that a completely reducible and faithful representation of a non-abelian group cannot split into a direct sum of one-dimensional subrepresentations!
- b) Use Schur's lemma to show that a complex irreducible representation of an abelian group is one-dimensional!