

## Symmetry Groups in Physics: Problems

### Problem 1 — Order of a group element

$SL(n, \mathbb{Z})$  is the group of all  $n \times n$  invertible matrices over  $\mathbb{Z}$  with determinant  $+1$ . Find elements in  $SL(2, \mathbb{Z})$  of order 3, of order 4 and of infinite order!

### Problem 2 — Each element has order two

Show the following: A group is abelian, if every element has order 2.  
Does such a group exist?

### Problem 3 — Generator of cyclic groups

List *all* generators of the cyclic group  $\mathbb{Z}_m$ !

### Problem 4 — Cycle graph

Draw the cycle graph of  $S_4$ !