- **Section 3.1: In the paper we use that**

  G^ijkl_0 xi_i xi_j xi_k xi_l = G^ijkl xi_i xi_j xi_k xi_l

  for the Tamm-Rubilar tensor density G^ijkl and the corresponding non-symmetrised version.

  In this notebook we check this result.

In[1]:=
```
p = Permutations[{x1, x2, x3, x4}]
```

Out[1]=
```
{{x1, x2, x3, x4}, {x1, x2, x4, x3}, {x1, x3, x2, x4}, {x1, x3, x4, x2}, {x1, x4, x2, x3},
 {x1, x4, x3, x2}, {x2, x1, x3, x4}, {x2, x1, x4, x3}, {x2, x3, x1, x4}, {x2, x3, x4, x1},
 {x2, x4, x1, x3}, {x2, x4, x3, x1}, {x3, x1, x2, x4}, {x3, x1, x4, x2}, {x3, x2, x1, x4},
 {x3, x2, x4, x1}, {x3, x4, x1, x2}, {x3, x4, x2, x1}, {x4, x1, x2, x3}, {x4, x1, x3, x2},
 {x4, x2, x1, x3}, {x4, x2, x3, x1}, {x4, x3, x1, x2}, {x4, x3, x2, x1}}
```

In[2]:=
```
Length[p]
```

Out[2]=
```
24
```

In[3]:=
```
G[i_, j_, k_, l_] := Module[
  {tmp, perm, x1, x2, x3, x4},

  p = Permutations[{x1, x2, x3, x4}];
  p = p /. {x1 → i, x2 → j, x3 → k, x4 → l};

  1 / 4 ! Sum[f[p[[s]][[1]], p[[s]][[2]], p[[s]][[3]], p[[s]][[4]]], {s, 1, Length[p]}]

 ]
```

In[4]:=
```
vars = {xi1, xi2, xi3, xi4};

symmetricSum = Sum[G[a1, a2, a3, a4] vars[[a1]] vars[[a2]] vars[[a3]] vars[[a4]],
   {a1, 1, 4}, {a2, 1, 4}, {a3, 1, 4}, {a4, 1, 4}];
```

In[6]:=
```
nonSymmetricSum = Sum[f[a1, a2, a3, a4] vars[[a1]] vars[[a2]] vars[[a3]] vars[[a4]],
   {a1, 1, 4}, {a2, 1, 4}, {a3, 1, 4}, {a4, 1, 4}];
```

In[7]:=
```
Simplify[symmetricSum - nonSymmetricSum]
```

Out[7]=
```
0
```