We introduce a transformation that relates particles with a difference in helicity of .

It can make the following transformations:

* Scalar field :
* Fermionic field :

and

* Vector field :

(In a supersymmetric transformation, the number of particles is conserved!)

These are the predicted partner particles in the Minimally Supersymmetric Standard Model:

|  |  |  |  |
| --- | --- | --- | --- |
| **Boson** | **Boson Partner** | **Fermion** | **Fermion Partner** |
| photon | photino | quark | squark |
| gluon | gluino | electron | selectron |
| W/Z | Wino/Zino | neutrino | sneutrino |
| Higgs (+extra) | Higgsino (+extra) |  |  |

However, we expect this model to be wrong as the partner particles have not been detected yet through accelerator experiments.

**Instead**, we can extend this to supersymmetry.

A supersymmetry of interest is the supersymmetry (super Yang-Mills theory).

This theory is of interest as it is scale-invariant and conformally invariant. However, this theory is only applicable to massless particles.

This theory is useful for investigating symmetries in quantum systems and simplifying computations.

**Also**, supersymmetries exist in theory, which, unlike , allows us to link all possible helicities of particles ( to ).