

## 16.75 XCOLOR: Color factor in some field theories

This package calculates the color factor in non-abelian gauge field theories using an algorithm due to Cvitanovich.

Documentation for this package is in plain text.

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Program "xCOLOR" is intended for calculation the colour factor in non-abelian gauge field theories. It is realized Cvitanovich algorithm [1]. In comparison with "COLOR" program [2] it was made many improvements. The package was written by symbolic mode. This version is faster then [2] more then 10 times.

After load the program by the following command `load xcolor;` user can be able to use the next additional commands and operators.

### Command SUDim.

Format: `SUDim <any expression>;`

Set the order of SU group.

The default value is 3, i.e. SU(3).

### Command SpTT.

Format: `SpTT <any expression>;`

Set the normalization coefficient  $A$ :  $\text{Sp}(T_i T_j) = A * \text{Delta}(i,j)$ .  
Default value is 1/2.

### Operator QG.

Format: `QG (inQuark, outQuark, Gluon)`

Describe the quark-gluon vertex. Parameters may be any identifiers. First and second of them must be in- and out- quarks correspondently. Third one is a gluon.

### Operator G3.

Format: `G3 (Gluon1, Gluon2, Gluon3)`

Describe the three-gluon vertex. Parameters may be any identifiers. The order of gluons must be clock.

In terms of QG and G3 operators you input diagram in "color" space as a product of these operators. For example.

Diagram:

REDUCE expression:

$$\begin{array}{c}
 e1 \\
 \text{----->----} \\
 / \qquad \qquad \backslash \\
 | \qquad e2 \qquad | \\
 v1 * \dots * v2 \\
 | \qquad \qquad | \\
 \backslash \qquad e3 \qquad / \\
 \text{-----<----}
 \end{array}
 \iff QG(e3, e1, e2) * QG(e1, e3, e2)$$

Here: --->--- quark

..... gluon

More detail see [2].

### References.

[1] P.Cvitanovic, Phys. Rev. D14(1976), p.1536.

[2] A.Kryukov & A.Rodionov, Comp. Phys. Comm., 48(1988), pp.327-334.

Please send any remarks to my address above!

Good luck!