Symmetries Fields and Particles Equation Sheet

quinten tupker

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Here are some useful equations

Table 1: Equation Sheet

Name/Description	Equation	Remarks
Pauli Matrices	$\sigma_1 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \sigma_2 = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}, \sigma_3 = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$	Together with the identity these form a basis for the space of traceless 2 by 2 matrices as a real vector space. Also, these are orthogonal under the trace matrix inner product $\text{tr}(AB)$.
Pauli Matrix product	$\sigma^i \sigma^j = \delta^{ij} I + i\epsilon^{ijk}\sigma^k$	