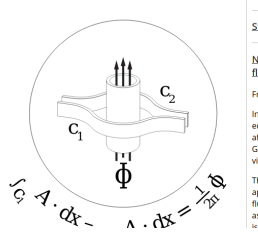# The Wall

1   Verified Equations

Equation 1 (Atiyah-Patodi-Singer).
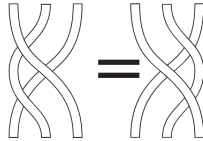
$$\dim \ker \not{D}_E \;-\; \dim \operatorname{coker} \not{D}_E = \int_M \hat{A}(M) \cdot ch(E)$$

Equation 2 (Aharonov-Bohm effect).

$$\int_{c_1} A \cdot dx - \int_{c_2} A \cdot dx = \frac{1}{2\pi}\Phi$$

Equation 3 (Yang-Baxter Equation).

Equation 4 (Euler Characteristic).

$$\chi = V - E + F$$

Equation 5 (Gauss-Bonnet).

$$2\pi\chi = \int_M K dA$$

Equation 6 (Stoke's Theorem).

$$\int_M d\omega = \int_{\partial M} \omega$$

Equation 7 (Dirac Equation).

$$(i\not{\partial} - m)\psi = 0$$

Equation 8 (Heisenberg).

$$[Q(f), Q(g)] = i\hbar Q(\{f, g\})$$

Equation 9 (Levi Cicita).

$$\nabla g = 0, \nabla_X Y - \nabla_Y X = [X, Y]$$

Equation 10 (Klein Gordon).

$$\Box \psi + \partial_\psi V = 0$$

Equation 11 (Borel-Weil-Bott).
$$\forall i : H^i(G/B, L_\lambda) = 0$$

Equation 12 (Einstein Field Equations).
$$R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4}T_{\mu\nu}$$

$$\frac{8\pi G}{c^4} T_{\mu\nu} = \boxed{?} + \left(\Lambda - \frac{1}{2}\boxed{?}\right)\cap$$

Equation 13 (Riemann Curvature Tensor Decomposition).
$$S_{abcd} + E_{abcd} + C_{abcd}$$

$$\text{[diagram]} = \text{[diagram]} = S_{abcd} + E_{abcd} + C_{abcd}$$

Equation 14 (Bianchi Identity).

$$= 0$$

Equation 15 (Energy-Mass Equivalence).
$$E = \gamma mc^2$$

Equation 16 (Faraday Tensor).
$$F = dA$$

2   Rough Equations

Equation 17 (Bianchi to Maxwell). $F = dA$
$df = d^2A = 0$
$\nabla_{[\alpha}F_{\beta\gamma]} = 0$
$J \star F = \mu_0 J$
$\Rightarrow \partial_\alpha F^{\alpha\beta} = \mu_0 J^\beta$

Equation 18 (Yang-Mills Equations).
$$\langle s, t\rangle_{L^2} = \int_X \langle s, t\rangle dvol_g$$
$$\langle d_A s, t\rangle_{L^2} = \langle s, d_A^* t\rangle_{L^2}$$
$$d_A^* F_A = 0$$
$$d_A \star F_A = 0$$
$$d\omega = d^*\omega = 0$$

3   Legacy Equations

Equation 19 (Bianchi Identity). $R^h_{ijk,l} + R^h_{ikl,j} + R^h_{ilj,k} = 0$
or
$D\Theta = \Omega \wedge \theta$ and $D\Omega = 0$

Equation 20 (Faraday Tensor). $dA = F$

Equation 21 (Energy-Mass Equivalence). $E_r = \sqrt{(m_0 c^2)^2 + (pc)^2}$

Equation 22 (Riemann Curvature Tensor Decomposition). $R_{abcd} = S_{abcd} + E_{abcd} + C_{abcd}$

Equation 23 (Klein Gordon). $\Box\psi + \partial_\psi V = 0$

Equation 24 (Dirac Equation).

$$\left(\beta m c^2 + c \sum_{n=1}^{3} \alpha p_n\right)\psi(x,t) = i\hbar\partial_t\psi(x,t)$$

Equation 25 (Yang-Baxter Equation).

$$(\check{R} \otimes 1)(1 \otimes \check{R})(\check{R} \otimes 1) = (1 \otimes \check{R})(\check{R} \otimes 1)(1 \otimes \check{R})$$

Equation 26 (Supergravity Lagrangian).
$$\mathcal{L} = R - \bar{\psi}_\mu \gamma^{\mu\rho\sigma} D_\rho \psi_\sigma$$

Equation 27 (Atiyah-Singer).

$$\operatorname{ind} D_e = \dim\ker D_E - \dim\ker D_E^* = \int_M \hat{A}(M,g)\operatorname{ch}^{E/\mathbb{S}}(E/\mathbb{S})$$

Equation 28 (Maxwell). $dF = 0$
$d \star F = J$