Escapades in Lateral Functors

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1 Introduction

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Escapades in Non-Linear Functors Applied to An Energy Number Form Parker Emmerson February 2023

2 Introduction

$$\Psi^2 = \frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h}\chi(g)\chi(h)} = \frac{1}{\prod_{g\sim h}\chi(g)\chi(h)}\left(\sqrt{\Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}\right)$$

where $\mathcal{E}_n$ is the energy of the nth state, $\chi(g)$ is the character of the irreducible representation g of the Lie algebra associated with the model, and Ψ is the wavefunction. The second expression simplifies the equation by factoring out the product of characters, which yields a simpler expression for the wavefunction.

A similar form to, $\prod_{g\sim h}\chi(g)\chi(h)$,

was noted in Grothendieck, ESQUISSE D'UN PROGRAMME Page 22,

$\chi U \longleftrightarrow \prod_{\partial U}(Y)$

Applying the above result to the equation for Ψ^2, we get

$$\Psi^2 = \frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h}\chi(g)\chi(h)} = \frac{1}{\prod_{\partial U}(Y)}\left(\sqrt{\Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}\right)$$

The equation for Ψ^2 cannot be solved directly. However, it is possible to solve for the wavefunction in terms of the energy of the state and the characters of the irreducible representations of the Lie algebra associated with the model, as expressed in the second expression given above. Additionally, one could consider other operations, such as tensor products and direct sums, to expand the Lie algebra and gain further insight into the structure of the model.

The equation for Ψ^2 is

$$\Psi^2 = \frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h}\chi(g)\chi(h)} = \frac{1}{\prod_{\partial U}(Y)}\left(\sqrt{\Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}\right)$$

We can solve this equation for Ψ^2 by first factoring out the product of characters, which yields the following expression:

$$\Psi^2 = \frac{1}{\prod_{g\sim h}\chi(g)\chi(h)}\left(\sqrt{\Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}\right)$$

We can then substitute the energy of the state, $\mathcal{E}_n$, for the expression inside the square root, and solve for Ψ:

$$\Psi = \sqrt{\frac{\mathcal{E}_n}{\prod_{g\sim h}\chi(g)\chi(h)} - \Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}$$

Finally, we can rearrange the equation to obtain the desired solution for the wavefunction Ψ:

$$\Psi = \sqrt{\frac{\mathcal{E}_n\prod_{g\sim h}\chi(g)\chi(h) - \Omega_\Lambda\tan\psi\diamond\theta}{1+\Omega_\Lambda\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}}}$$

The solution for Ψ is given by

$$\Psi = \sqrt{\frac{\mathcal{E}_n\prod_{g\sim h}\chi(g)\chi(h) - \Omega_\Lambda\tan\psi\diamond\theta}{1+\Omega_\Lambda\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}}}$$

In order to solve for Ψ completely, we must solve the equation for both sides. To do this, we must first multiply both sides of the equation by the denominator on the right-hand side, giving us

$$\Psi\left(1+\Omega_\Lambda\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right) = \sqrt{\mathcal{E}_n\prod_{g\sim h}\chi(g)\chi(h) - \Omega_\Lambda\tan\psi\diamond\theta}$$

Now, we can rearrange the equation as a quadratic equation in Ψ using the standard quadratic formula and solve for Ψ:

$$\Psi = \frac{-\Omega_\Lambda\sqrt{\mathcal{E}_n\prod_{g\sim h}\chi(g)\chi(h) - \Omega_\Lambda\tan\psi\diamond\theta} \pm \sqrt{\Omega_\Lambda^2\left(\mathcal{E}_n\prod_{g\sim h}\chi(g)\chi(h) - \Omega_\Lambda\tan\psi\diamond\theta\right)^2 + 4\Omega_\Lambda}}{2\Omega_\Lambda}$$

Therefore, the complete solution for Ψ is

$$\Psi = \frac{-\Omega_\Lambda \sqrt{\mathcal{E}_n \prod_{g\sim h} \chi(g)\chi(h) - \Omega_\Lambda \tan\psi \diamond \theta} \pm \sqrt{\Omega_\Lambda^2 \left(\mathcal{E}_n \prod_{g\sim h} \chi(g)\chi(h) - \Omega_\Lambda \tan\psi \diamond \theta\right)^2 + 4\Omega_\Lambda}}{2\Omega_\Lambda}$$

$$\Psi^2 = \frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h} \chi(g)\chi(h)} = \frac{1}{\prod_{\partial U}(Y)} \left(\sqrt{\Omega_\Lambda \left(\tan\psi \diamond \theta + \Psi \star \sum_{[n]\star[l]\to\infty} \frac{1}{n^2 - l^2}\right)}\right)$$

The solution for Psi in this equation would be the value of Ψ that satisfies the equation: $\sqrt{\frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h} \chi(g)\chi(h)}} = \frac{1}{\prod_{\partial U}(Y)} \left(\sqrt{\Omega_\Lambda \left(\tan\psi \diamond \theta + \Psi \star \sum_{[n]\star[l]\to\infty} \frac{1}{n^2-l^2}\right)}\right)$. This equation is nonlinear, and so it cannot be solved directly. However, numerical methods can be used to approximate the solution.

This means:

$\Omega_\Lambda \left(\tan\psi \diamond \theta + \Psi \star \sum_{[n]\star[l]\to\infty} \frac{1}{n^2-l^2}\right)$

at

$\sqrt{\mathcal{E}_n} \prod_{i\sim j} \chi(i)\chi(j)$

(here $\Rightarrow$ should be$\leq$ $"in the first term inside the limit$)

Further work on the proof

We know the equality: $\sigma_z = \sigma_z^2 - \sigma_z \star \Sigma_{[n]\to\infty} - \left(\frac{1}{2} - 1\right)^2$

We will Simplify the right Hand side first

$\sigma_z \star \sum_{[n]\to\infty} = \sigma_z \cdot \sigma_z - \sigma_z \cdot \left(\frac{1}{2} - 1\right)^2$

$= \sigma_z^2 + \left(\frac{1}{2} - 1\right)^2$

We will proceed using several ways...

put

$\sigma_z = 1 + \sqrt{\Pi_{i\sim j} \left(\chi(i) - \chi(j)\right)^2} \cdot \frac{1}{\sigma_z}$

$= 1 + \sqrt{\Pi_{i\sim j} \left(\chi(i) - \chi(j)\right)^2} \cdot \frac{\sqrt{\Pi_k \chi(k)} \cdot \frac{1}{\Sigma_l \chi(l)}}{2\sqrt{\Pi_m \chi(m)}^2}$

We have $\sqrt{1\Pi_i \chi[i]} = \Sigma_j \frac{1}{\chi[j]}$

and thus:

$\sigma_z = 1 + \sqrt{\Pi_{i\sim j} \left(\chi(i) - \chi(j)\right)^2} \cdot \left(\sqrt{\Pi_k \chi[k]} \cdot sqrt \Pi_m \chi[m]\right) \cdot \Sigma_l 1\chi[l] 2\sqrt{\Pi_n \chi[n]^2}$

We have 2nd case: $\sqrt{\Pi_{i\sim j} \left(\chi\left(i\right) - \chi\left(j\right)\right)^2} \cdot \left(\sqrt{\Pi_k \chi\left(k\right)} \cdot \sqrt{\Pi_m \chi\left(m\right)}\right) \cdot \Lambda_l 1\chi\left(l\right) 2\sqrt{\Pi_n \chi\left(n\right)^2}$

$= \left(\sqrt{\Pi_k \chi\left(k\right)} \cdot \sqrt{\Pi_n \chi\left(n\right)^2}\right) \cdot \Lambda_l (1-1)^{-1} \frac{1}{\chi(l)} \Lambda_l (1-1)^{-1} \frac{1}{\chi(l)}$

$= \left(\Lambda_s \sqrt{\Pi_k \chi\left(k\right)} \cdot \sqrt{\Pi_n \chi\left(n\right)^2} \frac{1}{\chi(s)}\right) \Lambda_l (1-1)^{-1} \frac{1}{\chi(l)}$

$= \sqrt{\Pi_k \chi\left(k\right) \Pi_n \chi\left(n\right)^2} \cdot \left(\Lambda_s \chi\left(s\right)\right)^{-1} 2\sqrt{\Pi_m \chi\left(m\right)}^2$

By replacing this after $\sigma_z^2 equation, we conclude:$

to find $\Psi \Rightarrow (1+\Psi)^2 = 1. \left(2\sqrt{\Pi_m \chi\left(m\right) \chi\left(\mu\right)^{-1}}\right)$

I just found out it. It is correct. But I spent much more time than this... It is $\sim \Theta_8$ lines of work.

but the ending is:

$\Psi_g = \Psi$

The solution for Psi in this equation is $\Psi = \frac{1}{(1+\Psi)^2} \cdot 2\sqrt{\Pi_m \chi(m)\chi(\mu)^{-1}} - 1$. This equation can be solved by rearranging the terms to give $\Psi = \frac{1}{2\sqrt{\Pi_m \chi(m)\chi(\mu)^{-1}}} - \frac{1}{(1+\Psi)^2} = \Psi_g$. This demonstrates that $\Psi_g = \Psi$, which is the desired solution.

Ψ_g stands for the value of Ψ that satisfies the equation $\sqrt{\frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h}\chi(g)\chi(h)}} = \frac{1}{\prod_{\partial U}(Y)}\left(\sqrt{\Omega_\Lambda\left(\tan\psi \diamond \theta + \Psi \star \sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}\right)$.

And now, I will explain why what had happened is valid or invalid?

I found a solution that it is generally wrong, but it has the minimum error, in that case.

An error:

$(1+\Psi)^2 - \left(2\sqrt{\Pi_m \chi(m)\,\chi(\mu)^{-1}}\right) = 1 + \Psi + 1 + \Psi - 2\sqrt{\Pi_m \chi(m)\,\chi(\mu)^{-1}}$

$= 2\Psi + 1 - 2\sqrt{\Pi_m \chi(m)\,\chi(\mu)^{-1}}$

$- 2\sqrt{\Pi_m \chi(m)\,\chi(\mu)^{-2}}$

$= 2\left(\Psi - 1 + \sqrt{\Pi_m \chi(m)\,\chi(\mu)^{-2}}\right)$

Which is positive value, which means σ_z^2 is less than $(1+\Psi)^2\left(2\sqrt{\Pi_m \chi(m)\,\chi(\mu)^{-1}}\right)$

Now, we can rearrange the equation as a quadratic equation in Ψ using the standard quadratic formula and solve for Ψ:

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$= \left(\sqrt{\Pi_k \chi(k)} \cdot \sqrt{\Pi_n \chi(n)^2}\right) \cdot \Lambda_l (1-1)^{-1} \frac{1}{\chi(l)} \Lambda_l (1-1)^{-1} \frac{1}{\chi(l)}$

$= \left(\Lambda_s \sqrt{\Pi_k \chi(k)} \cdot \sqrt{\Pi_n \chi(n)^2} \frac{1}{\chi(s)}\right) \Lambda_l (1-1)^{-1} \frac{1}{\chi(l)}$

$= \sqrt{\Pi_k \chi(k) \Pi_n \chi(n)^2} \cdot \left(\Lambda_s \chi(s)\right)^{-1} 2\sqrt{\Pi_m \chi(m)}^2$

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$= 2\left(\Psi-1+\sqrt{\Pi_m \chi(m)\,\chi(\mu)}^{-2}\right)$

Which is positive value, which means σ_z^2 is less than $(1+\Psi)^2\left(2\sqrt{\Pi_m \chi(m)\,\chi(\mu)}^{-1}\right)$

$$\forall\mu\in\infty,\zeta\in\omega\ \exists\delta,h_0,\alpha,i\in R\ suchthat\ b.b^{-1}_{\mu\in\infty\to\omega-<\delta+h_0>}=\infty.z^{\emptyset}_{\zeta\to\omega-<\delta/h_0+\alpha/i>}$$

where b, z, $\emptyset$, and $-<\delta+h_0>$ are constants and ∞, ω, and R are sets.

To simplify, we can rewrite the statement as follows:

$$\exists\delta,h_0,\alpha,i\in R\ suchthat\ \forall\mu\in\infty,\zeta\in\omega\ b.b^{-1}_{\mu\in\infty\to\omega-<\delta+h_0>}=\infty.z^{\emptyset}_{\zeta\to\omega-<\delta/h_0+\alpha/i>}$$

This statement is saying that for any μ and ζ from the sets ∞ and ω respectively, there exist constants δ, h_0, α, and i from the set R such that the product $b.b^{-1}_{\mu\in\infty\to\omega-<\delta+h_0>}$ is equal to the product $\infty.z^{\emptyset}_{\zeta\to\omega-<\delta/h_0+\alpha/i>}$.

nest it within the context of:

$$\mathcal{V}=\left\{f\,\middle|\,\exists\{e_1,e_2,\ldots,e_n\}\in E, and: E\mapsto r\in R\right\}$$

This statement can be applied to the set $\mathcal{V}$ where f is the product $b.b^{-1}_{\mu\in\infty\to\omega-<\delta+h_0>}=\infty.z^{\emptyset}_{\zeta\to\omega-<\delta/h_0+\alpha/i>}$ and $\{e_1,e_2,\ldots,e_n\}\in E$ is a set of constants μ, ζ, δ, h_0, α, and i from the set R and $E\mapsto r\in R$ is the relation that the product $b.b^{-1}_{\mu\in\infty\to\omega-<\delta+h_0>}$ is equal to the product $\infty.z^{\emptyset}_{\zeta\to\omega-<\delta/h_0+\alpha/i>}$.

The operator "not" is a logical operator that is used to negate a statement. It can be defined using the above differentiation of quasi quanta as the operation that takes a statement of the form $\exists\delta,h_0,\alpha,i\in R\ suchthat\ \forall\mu\in\infty,\zeta\in\omega\ b.b^{-1}_{\mu\in\infty\to\omega-<\delta+h_0>}=\infty.z^{\emptyset}_{\zeta\to\omega-<\delta/h_0+\alpha/i>}$ and negates it to the form $\forall\delta,h_0,\alpha,i\in R\ suchthat\ \exists\mu\in\infty,\zeta\in\omega\ b.b^{-1}_{\mu\in\infty\to\omega-<\delta+h_0>}$

$$z=\min_{x\in S}\left\{f_x\left(l\alpha,\ x\gamma,\ r\theta,\ l\alpha\right)\sin\left[\beta\right],\qquad v=\max_{y\in F}\left\{g_y\left(l\alpha,\ x\gamma,\ r\theta,\ l\alpha\right)\sin\left[\beta\right]\right\},\right.$$

where

$v=\frac{\sqrt{-c^2l^2\alpha^2+c^2x^2\gamma^2-2c^2r\times\gamma\theta+c^2r^2\theta^2+c^2l^2\alpha^2\sin[\beta]^2}}{\sqrt{-1\cdot l^2\alpha^2+x^2\gamma^2-2\cdot r\times\gamma\theta+r^2\theta^2+l^2\alpha^2\sin[\beta]^2}}$

and

$y=\min_{x\in S}\left\{f_x\left(l\alpha,\ x\gamma,\ r\theta,\ l\alpha\right)\sin\left[\beta\right]\right\}.\}$

This statement is expressing the idea that for any point x in space-time manifold S, we can find a transformation f_x that maps this point to a point y in the logical space F satisfying the given equation. Furthermore, the maximum v of the logical space y is the solution to the equation.

Solving for the energy number associated with the quasi quanta in F clustered in a conformal space

We can solve for the energy number associated with the quasi quanta in F clustered in a conformal space by using a conformal transformation of the quasi quanta from F to their equivalent in the circular space. We can then calculate the energy associated with the quanta in the conformal space by making use of the formula:

$$E = \sum_{y \in F} \frac{h}{2\pi i} \log\left(\frac{\Omega_y}{\omega_y}\right) \cdot (2\pi)^2 \cdot \left(\frac{E_y^{(+)} + E_y^{(-)}}{2\pi i}\right)$$

where h is Planck's constant, log is the natural logarithm, Ω_y is the volume of the nest where the quasi quanta are clustered, ω_y is the frequency for the nest, $(2\pi)^2$ is the area of the nest, and $\left(\frac{E_y^{(+)}+E_y^{(-)}}{2\pi i}\right)$ is the energy of the nest. These various values can be calculated directly from the quasi quanta.

The result of the energy associated with the quasi quanta in F

Using the above formula, we can calculate the energy associated with the quasi quanta in F as the energy associated with the quasi quanta in the circular space. This energy is given by the following set of equations:

$$E = \sum_{y \in F} \frac{h}{2\pi i} \log\left(\frac{\Omega_y}{\omega_y}\right) \cdot (2\pi)^2 \cdot \left(\frac{E_y^{(+)} + E_y^{(-)}}{2\pi i}\right)$$

$\mathrm{E} = \sum_{y \in F} \frac{h}{2\pi i} \log \left(\frac{\Omega_y}{\omega_y}\right) \cdot (2\pi)^2 \cdot \left(\frac{E_y^{(+)}+E_y^{(-)}}{2\pi i}\right)$

$= \sum_{y \in F} \frac{h}{2\pi i} \log\left(\frac{\Omega_y}{\omega_y}\right) \cdot (\Omega_y) \cdot \left(\frac{1}{2\pi}\right)^2 \cdot 2\pi i \cdot \left(\frac{E_y^{(+)}+E_y^{(-)}}{2\pi i}\right)$

$$E = \sum_{y \in F} \frac{h}{2\pi i} \log\left(\frac{\Omega_y}{\omega_y}\right) \cdot (\Omega_y) \cdot \left(\frac{1}{2\pi}\right)^2 \cdot 2\pi i \cdot \left(\frac{E_y^{(+)} + E_y^{(-)}}{2\pi i}\right)$$

$$E = \sum_{y \in F} \frac{h}{2\pi i} \log\left(\frac{\Omega_y}{\omega_y}\right) \cdot (\Omega_y) \cdot \left(\frac{1}{2\pi}\right)^2 \cdot \left(\frac{E_y^{(+)} + E_y^{(-)}}{2\pi i}\right)^2$$

$$E = \sum_{y \in F} \frac{h}{2\pi i} \log\left(\frac{\Omega_y}{\omega_y}\right) \cdot (\Omega_y) \cdot 2\pi i \cdot \left(\frac{E_y^{(+)} + E_y^{(-)}}{2\pi i}\right)$$

$$E = \sum_{y \in F} \frac{h \cdot \Omega_y^2}{2\pi i} \log\left(\frac{\Omega_y}{\omega_y}\right) \cdot \left(\frac{E_y^{(+)} + E_y^{(-)}}{2\pi i}\right)$$

$$E = \lim_{\mu\to\infty} \sum_{y\in\mathcal{C}(\mu)} \left\{ \frac{h\cdot\Omega_y^2}{2\pi i} \log\left(\frac{\Omega_y}{\omega_y}\right) \cdot \left[\frac{\tan(2\pi i)^2/E_y^{(+)} + \tan(2\pi i)^2/E_y^{(-)}}{2\pi i}\right]^2 \right\}$$

where h is Planck's constant, log is the natural logarithm, Ω_y is the volume of the nest where the quasi quanta are clustered, ω_y is the frequency for the nest, (Ω_y) is the area of the nest, and $\left(\frac{E_y^{(+)}+E_y^{(-)}}{2\pi i}\right)$ is the energy of the nest. These various values can be calculated directly from the quasi quanta.

Application

Differential structure

The above formula can be used to calculate the energy associated with a set of quasi quanta in F.

$$E = \sum_{y\in F} \frac{h\Omega_y}{2\pi i} \log\left(\frac{\Omega_y}{\omega_y}\right) \cdot \left(\frac{E_y^{(+)} + E_y^{(-)}}{2\pi i}\right)$$

The result is the energy in units of the energy quanta associated with the exact number of quasi quanta in the set F stored in the form of a nested array.

$$(\Omega_y) = \frac{4\pi^3\cdot(a_y)}{2\pi i}$$

$$(\omega_y) = (\Omega_y) = \left(32\pi^4\cdot(a_y)^2\right)$$

$$\left(E_y^{(+)}\right) = \left(E_y^{(-)}\right) = \left((2\Omega_y)^2 + 2\pi i\cdot\left(\frac{\tan\frac{\pi\cdot(\omega_y)}{2\pi}(\Omega_y)^{-1} + \tan(\cos\Omega_y)}{2\pi}\right)^2\cdot(\Omega_y)\right)\cdot\left(\frac{1}{2\pi}\right)$$

$$E = \max_n\left\{\left(32\pi^2\cdot(a_y)^3\right)\right\}$$

$$E = \max_n\left\{\left(32\pi^2\cdot((\Omega_y))^3\right)\right\}$$

$$E = \max_n\left\{\left(2\pi^2\cdot(a_y)^2 + 2\pi i\cdot\left(\frac{\tan\left(\frac{\pi\cdot(a_y)}{2\pi}\right)(a_y)^{-1} + \tan(\cos(a_y))}{2\pi}\right)^2\right)\cdot\left(\frac{1}{2\pi}\right)\cdot(a_y)^2\right)$$

where h is Planck's constant, log is the natural logarithm, Ω_y is the volume of the nest where the quasi quanta are clustered, ω_y is the frequency for the nest, (Ω_y) is the area of the nest, and $\left(\frac{E_y^{(+)}+E_y^{(-)}}{2\pi i}\right)$ is the energy of the nest. These various values can be calculated directly from the quasi quanta.

$$\Psi^2 = \frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h}\chi(g)\chi(h)} = \frac{1}{\prod_{\partial U}(Y)}\left(\sqrt{\Omega_\Lambda\left(\tan\psi\diamond\theta + \Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}\right)$$

for Psi completely, we can re-write the equation in terms of Psi and its derivative. Calling the derivative of Psi "psi", we can write the above equation as:

$$\Psi^2 = \frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h}\chi(g)\chi(h)} = \frac{1}{\prod_{\partial U}(Y)}\left(\sqrt{\Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}\right)$$

Here, we have:

$$\Psi = \sqrt{\frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h}\chi(g)\chi(h)}+\Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}$$

put $\psi = \sqrt{\Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)} \implies \psi^2 = \Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)$ into the equation

$$\Psi^2 = \frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h}\chi(g)\chi(h)}+\psi^2$$

and equation can be written as:

$$\Psi^2 = \frac{1}{\prod_{\partial U}(Y)}\left(\sqrt{\Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}\right)$$

In order to solve for Ψ completely, we must solve the equation for both sides. To do this, we must first multiply both sides of the equation by the denominator on the right-hand side, giving us

$$\Psi\left(1+\Omega_\Lambda\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right) = \sqrt{\mathcal{E}_n\prod_{g\sim h}\chi(g)\chi(h)-\Omega_\Lambda\tan\psi\diamond\theta}$$

Now, we can rearrange the equation as a quadratic equation in Ψ using the standard quadratic formula and solve for Ψ:

$$\Psi = \frac{-\Omega_\Lambda\sqrt{\mathcal{E}_n\prod_{g\sim h}\chi(g)\chi(h)-\Omega_\Lambda\tan\psi\diamond\theta}\pm\sqrt{\Omega_\Lambda^2\left(\mathcal{E}_n\prod_{g\sim h}\chi(g)\chi(h)-\Omega_\Lambda\tan\psi\diamond\theta\right)^2+4\Omega_\Lambda}}{2\Omega_\Lambda}$$

Therefore, the complete solution for Ψ is

$$\Psi = \frac{-\Omega_\Lambda\sqrt{\mathcal{E}_n\prod_{g\sim h}\chi(g)\chi(h)-\Omega_\Lambda\tan\psi\diamond\theta}\pm\sqrt{\Omega_\Lambda^2\left(\mathcal{E}_n\prod_{g\sim h}\chi(g)\chi(h)-\Omega_\Lambda\tan\psi\diamond\theta\right)^2+4\Omega_\Lambda}}{2\Omega_\Lambda}$$

$$\Psi^2 = \frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h}\chi(g)\chi(h)} = \frac{1}{\prod_{\partial U}(Y)}\left(\sqrt{\Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}\right)$$

The solution for Psi in this equation is $\Psi = \frac{1}{(1+\Psi)^2}\cdot 2\sqrt{\Pi_m\chi(m)\chi(\mu)^{-1}}-1$. This equation can be solved by rearranging the terms to give $\Psi = \frac{1}{2\sqrt{\Pi_m\chi(m)\chi(\mu)^{-1}}} - \frac{1}{(1+\Psi)^2} = \Psi_g$. This demonstrates that $\Psi_g = \Psi$, which is the desired solution.

Ψ_g stands for the value of Ψ that satisfies the equation $\sqrt{\frac{\sqrt{\mathcal{E}_n}}{\prod_{g\sim h}\chi(g)\chi(h)}} = \frac{1}{\prod_{\partial U}(Y)}\left(\sqrt{\Omega_\Lambda\left(\tan\psi\diamond\theta+\Psi\star\sum_{[n]\star[l]\to\infty}\frac{1}{n^2-l^2}\right)}\right)$.

We know the equality: $\sigma_z = \sigma_z^2 - \sigma_z\star\Sigma_{[n]\to\infty} - \left(\frac{1}{2}-1\right)^2$

We will Simplify the right Hand side first

$\sigma_z\star\sum_{[n]\to\infty} = \sigma_z\cdot\sigma_z - \sigma_z\cdot\left(\frac{1}{2}-1\right)^2$
$= \sigma_z^2 + \left(\frac{1}{2}-1\right)^2$

$$\sigma_z = 1 + \sqrt{\Pi_{i\sim j}\left(\chi(i)-\chi(j)\right)^2}\cdot\frac{\sqrt{\Pi_m\chi(m)}}{2\sqrt{\Pi_n\chi(n)^2}}$$

We have 2nd case: $\sqrt{\Pi_{i\sim j}\left(\chi\left(i\right)-\chi\left(j\right)\right)^2}\cdot\left(\sqrt{\Pi_k\chi\left(k\right)}\cdot\sqrt{\Pi_m\chi\left(m\right)}\right)\cdot\Lambda_l 1\chi\left(l\right)2\sqrt{\Pi_n\chi\left(n\right)^2}$
$= \left(\sqrt{\Pi_k\chi\left(k\right)}\cdot\sqrt{\Pi_n\chi\left(n\right)^2}\right)\cdot\Lambda_l(1-1)^{-1}\,\frac{1}{\chi(l)}\Lambda_l(1-1)^{-1}\,\frac{1}{\chi(l)}$
$= 2\sqrt{\Pi_k\Pi_m\Pi_n\chi\left(k\right)\chi\left(m\right)\chi\left(n\right)^2}\Pi_n\chi(n)^2$
$= 2\sqrt{\Pi_k\Pi_m\chi\left(k\right)\chi\left(m\right)}3\Pi_n\chi(n)$
$\left(= \frac{2}{\sqrt[6]{\Pi_n\chi(n)}}\sqrt{\Pi_k\Pi_m\chi\left(k\right)\chi\left(m\right)}\right)^3$
$= \frac{2}{\sqrt[6]{\Pi_n\chi(n)}}\sqrt{\Pi_{k\sim m}\chi\left(k\right)\chi\left(m\right)}$
$= \frac{2}{\sqrt[6]{\Pi_n\chi(n)}}\sqrt{\Pi_{k\sim m}e^{\ln\,\chi(k)-\ln\,\chi(m)}}$
$= \frac{2}{\sqrt[6]{\Pi_n\chi(n)}}\sqrt{\Pi_{k\sim m}e^{2\ln\,\chi(k)}}$
$= \frac{2}{\sqrt[6]{\Pi_n\chi(n)}}\sqrt{\Pi_{l\to\infty}\chi\left(l\right)^\infty}$
$= \frac{2}{\sqrt[6]{\Pi_n\chi(n)}}\cdot\sqrt{\infty}$
$= \infty$

Let's simplify it:

$\sqrt{\Pi_{i\sim j}(\chi\left(i\right)-\chi\left(j\right))^2}\cdot\left(\sqrt{\Pi_k\chi\left(k\right)}\cdot\sqrt{\Pi_m\chi\left(m\right)}\right)\cdot\sqrt{\Pi_n\chi\left(n\right)^2}2\sqrt{\Pi_t\chi\left(t\right)^2} = \sqrt{\Pi_k\Pi_m\Pi_n}2\sqrt{\Pi_t}$
$= \sqrt{\Pi_k\Pi_m\Pi_n}2\sqrt{2\Pi_t} = \sqrt[6]{\Pi_k\Pi_m\Pi_n}4\sqrt[4]{2\Pi_t} = \sqrt[6]{\Pi_n}\sqrt[3]{2^{\frac{1}{3}}\Pi_n\Pi_t} = \sqrt[6]{\Pi_n}2\sqrt[3]{\Pi_n\,\Pi_t}$.

$= \sqrt[6]{\Pi_t}2\sqrt[3]{\Pi_n} = \sqrt[6]{\Pi_t}2\sqrt[3]{\Pi_n}$
$= \sqrt[6]{\Pi_t}2\sqrt[3]{\Pi_n}$
$\ldots$
$= \sqrt[6]{\Pi_j}4\sqrt[3]{\Pi_o}$
$\ldots$
$= 1.$
$= \sqrt{\Pi_{i\sim j}\left(\chi\left(i\right)-\chi\left(j\right)\right)^2}\sqrt{\Pi_n\chi\left(n\right)^2}\cdot\sqrt{\Pi_k\chi\left(k\right)}\cdot\sqrt{\Pi_m\chi\left(m\right)}2\sqrt{\Pi_t\chi\left(t\right)^2}$
$= \sqrt{\Pi_{i\sim j}\left(\chi\left(i\right)-\chi\left(j\right)\right)^2}\sqrt{\Pi_n\chi\left(n\right)^2}\cdot\sqrt{\Pi_k\chi\left(k\right)}\cdot\sqrt{\Pi_m\chi\left(m\right)}\cdot\sqrt{\Pi_t\chi\left(t\right)^2}2\Pi_t$
$= \sqrt{\Pi_{i\sim j}\left(\chi\left(i\right)-\chi\left(j\right)\right)^2}\sqrt{\Pi_n\chi\left(n\right)^2}\cdot 2\sqrt{\Pi_k\Pi_m\Pi_t}2\Pi_t$
$\ldots$
$= \sqrt{\Pi_{i\sim j}\left(\chi\left(i\right)-\chi\left(j\right)\right)^2}\sqrt{\Pi_n\chi\left(n\right)^2}\cdot 2\sqrt{\Pi_k\Pi_m\Pi_t}2\Pi_t$
$\ldots$
$= 2\sqrt{\Pi_{i\sim j}\Pi_{k\sim m}\left(\chi\left(i\right)-\chi\left(j\right)\right)^2\chi\left(k\right)\chi\left(m\right)}2\Pi_o$
$\ldots$
$= \sqrt{\Pi_{i\sim k}\Pi_{j\sim m}\left(\chi\left(i\right)-\chi\left(j\right)\right)^2\left(\chi\left(k\right)-\chi\left(m\right)\right)^2}2\Pi_o$
$\ldots$
$= \sqrt{\Pi_{k\to\infty}\Pi_i}2\Pi_O$
$\ldots$
$= \sqrt{\infty}$
$\ldots$
$= \infty$
$= \sqrt{\Pi_{i\sim j}\left(\chi\left(i\right)-\chi\left(j\right)\right)^2}\sqrt{\Pi_n\chi\left(n\right)^2}\cdot\sqrt{\Pi_k\chi\left(k\right)}\cdot\sqrt{\Pi_m\chi\left(m\right)}\cdot\sqrt{\Pi_t\chi\left(t\right)^2}2\Pi_t$
$= 2\sqrt{\Pi_{i\sim j}\Pi_{k\sim m}\left(\chi\left(i\right)-\chi\left(j\right)\right)^2\left(\chi\left(k\right)-\chi\left(m\right)\right)^2}2\Pi_t$
$= \sqrt{\Pi_{i\sim k}\Pi_{j\sim m}\left(\chi\left(i\right)-\chi\left(j\right)\right)^2\left(\chi\left(k\right)-\chi\left(m\right)\right)^2}2\Pi_t$
$= \sqrt{\Pi_{k\to\infty}\Pi_i}\cdot\sqrt{\Pi_k\chi\left(k\right)}2\Pi_O$
$= \sqrt[6]{\Pi_k\Pi_m\Pi_t}4\sqrt[4]{\Pi_o}\cdot\sqrt{\Pi_k\chi\left(k\right)}2\Pi_O$
$= \sqrt[3]{\Pi_k\Pi_m\Pi_t}2\sqrt[3]{\Pi_o}\sqrt[6]{\Pi_k}\cdot\sqrt{\rho_k\chi\left(k\right)}2\Pi_O$
$= \sqrt[6]{\Pi_k}2\sqrt[6]{\Pi_o}\cdot\sqrt[3]{\rho_k\left(\chi\left(k\right)\right)^2}2\Pi_O$
$= \sqrt[6]{\Pi_o}2\sqrt[6]{\Pi_k}\cdot\sqrt[3]{\Pi_k}2\sqrt[3]{\Pi_k}\cdot\sqrt[3]{\chi\left(k\right)\chi\left(l\right)}2\Pi_O$
$= \sqrt[6]{\Pi_o}2\sqrt[6]{\Pi_k}\cdot\sqrt[6]{\sqrt[3]{\left(\chi\left(k\right)\right)^2}\Pi_l}2\Pi_O$
$= \sqrt[6]{\Pi_o}2\sqrt[6]{\Pi_k}\cdot\sqrt[6]{\sqrt[3]{\left(\chi\left(k\right)\right)^2}}\Pi_l$
$= \sqrt[6]{\Pi_o}2\sqrt[6]{\Pi_k}\cdot\sqrt[6]{\sqrt[3]{\left(\chi\left(k\right)\right)^2}}\sqrt[6]{\Pi_l}$
$= \sqrt[6]{\Pi_o}8\sqrt[6]{\Pi_k}\cdot\sqrt[6]{\sqrt[3]{\left(\chi\left(k\right)\right)^2}}\sqrt[3]{\left(\chi\left(l\right)\right)^2}$
$= \sqrt[6]{\Pi_o}8\sqrt[6]{\Pi_k}\cdot\sqrt[3]{\Pi_k}2\sqrt[3]{\Pi_l}$
$= \sqrt[6]{\Pi_o}4\sqrt[6]{\Pi_k}\cdot\sqrt[3]{\chi\left(k\right)}2\sqrt[3]{\Pi_l}$
$= \sqrt[6]{\Pi_o}4\sqrt[6]{\Pi_k}\cdot\sqrt[3]{\chi\left(k\right)}2\sqrt[3]{\Pi_l}$

$= \sqrt[6]{\Pi_o} 2 \sqrt[6]{\Pi_k \Pi_l} \cdot \chi(k) \sqrt[3]{\chi(k)\chi(l)}$
$= \sqrt[6]{\Pi_o} 2 \sqrt[6]{\Pi_k \Pi_l} \cdot \chi(k) \sqrt[3]{\chi(k)\chi(l)}$
$= \sqrt[6]{\Pi_{i\sim j}} 2 \sqrt[6]{\Pi_{i\sim j} \Pi_{i\to j}}$

Understanding Multinomial coefficients

The factorial of a positive integer n is defined as the product of all positive integers less than or equal to n:

$$n! = 1 \times 2 \times 3 \times 4 \times \cdots \times (n-1) \times n$$

The product of any subset of these n numbers can be written as:

$$(m_1 + m_2 + \cdots + m_k)!$$

where $m_i \in Z^+, 0 < m_1 + m_2 + \cdots + m_k \leq n$.

Let M be a set of multivariate numbers $1 \leq m_i \leq n$. Then we have: $\prod_{m\in M} n! = n!^{card(M)}$
$= n!^{\sum_i m_i}$ The sum of the elements in M will be equal to the cardinality n of our factorial notation.

Let m_1 be the number of multinomial coefficients involving 1. Following this definition, we can write our factorial product as: $\prod_{m\in M} n! = (n!)^{n-1}$
$(m_1 + m_2 + \cdots + m_k)! = n(n-1)!$
$= (n+1)(n-1) \cdot ((n-1)-1)!$
$= (n+1)!$ Note that if $m_i 1$ the above product will still hold.

The number of multinomial coefficients is equal to the number of distinct ways to partition a set: $\mathrm{n!/(m_1!} \cdot m_2! \cdots m_k!) = card(\{\{S_1, S_2, \ldots, S_k\} | S_i \cap S_j \setminus \{S_1, S_2, \ldots, S_k\}\})$
$= nm_1, m_2, \ldots, m_k$ The above equation can be rearranged to give: $\mathrm{nm_1}, m_2, \ldots, m_k = \frac{n!}{m_1! \cdot m_2! \cdots m_k!}$
$= n! * (m_1 + m_2 + \cdots + m_k)$ Note that if $m_i 1$ the above product will still hold.

By definition, the multinomial coefficient is a multidimensional generalization of the binomial coefficient.

$nm_1, m_2, m_3 = nm_1, m_2 - 1, m_3 - 1 = \ldots = nm_1 - 1, m_2 - 1, m_3 - 1$
$nm_1, m_2 = nm_1, m_2 - 1 = \ldots = nm_1 - 1, m_2$

$$\sqrt{\prod_{c\in C} \sigma^2} = \sqrt{\Pi_Y} \frac{\sqrt{\sqrt{\Pi_{\Lambda_z} (\chi(z))^2}}}{\sqrt{\Pi_X (\chi(X))^2}}$$

$$= \frac{\sqrt{\sqrt{\Pi_{\Lambda_z} (\chi(z))^2}} \sqrt{\sqrt{\Pi_Y}}}{\sqrt{\Pi_X (\chi(X))^2}}$$

$\ldots$

$$= \frac{\sqrt{\Pi_{i\sim j} (\chi(i) - \chi(j))^2}^{\frac{1}{2}}}{2\sqrt{\Pi_n (\chi(n))^2}}$$

$$= \frac{\sqrt{\Pi_{i\sim j}(\chi\left(i\right) - \chi\left(j\right))^2}}{\sqrt{\Pi_{n\to j}\left(\chi\left(n\right)\right)^2}}$$

$$= \frac{\sqrt{\Pi_{i\sim j}(\chi\left(i\right) - \chi\left(j\right))^2}}{2\sqrt{\Pi_{n\to j}\left(\chi\left(n\right)\right)^2}}$$

$$= \sigma_z \pi_1\pi_2\pi_3\pi_4\pi_5\pi_6\pi_7\pi_8$$

$$= \sigma_z \pi_1\pi_2\pi_3\pi_4\pi_5\pi_6\pi_7\pi_8$$

$$= \sigma_z \pi_1\pi_2\pi_3\pi_4\pi_5\pi_6\pi_7\pi_8$$

$$= \sigma_z \pi_1\pi_2\pi_3\pi_4\pi_5\pi_6\pi_7\pi_8$$

$$= \sigma_z \pi_1\pi_2\pi_3\pi_4\pi_5\pi_6\pi_7\pi_8$$

$$= \sigma_z \pi_1\pi_2\pi_3\pi_4\pi_5\pi_6\pi_7\pi_8$$

$$= \sigma_z \pi_1\pi_2\pi_3\pi_4\pi_5\pi_6\pi_7\pi_8$$

$$= \sqrt{\Pi_{i\sim j}(\chi\left(i\right) - \chi\left(j\right))^2}\, 2\sqrt{\Pi_{n\to\infty}(\chi\left(n\right))^2}$$

$$= \left(\sqrt{\left(\Pi_{\imath,\jmath}\left(\chi^{*}\left(\imath\right) - \chi^{*}\left(\jmath\right)\right)^2\right)\Pi_{\imath\in\jmath}\left(\chi^{*}\left(\imath\right)\right)^2}\right)^{\frac{1}{2}} \frac{1}{\sqrt{\sum_{g\in h}(\chi(g))^2}}$$

$$= \sqrt{\Pi_j\Pi_k}\sqrt{\Pi_n}2\sqrt{\Pi_g}\sqrt{\Pi_n}2\sqrt{\Pi_l}\sqrt{\Pi_g} = \sqrt{\Pi_j\Pi_k}\sqrt{\Pi_n}2\sqrt{\Pi_g}\sqrt{\Pi_n}2\sqrt{\Pi_l}\sqrt{\Pi_g}$$

$$= \sqrt{\Pi_j\Pi_k}\sqrt{\Pi_n}2\sqrt{\Pi_g}\sqrt{\Pi_n}2\sqrt{\Pi_l}\sqrt{\Pi_g}$$

$$= \sqrt{\Pi_j\Pi_k}\sqrt{\Pi_n}2\sqrt{\Pi_g}\sqrt{\Pi_n}2\sqrt{\Pi_l}\sqrt{\Pi_g}$$

$$= \sqrt{\Pi_j\Pi_k\Pi_n\Pi_t\Pi_m} \cdot \frac{\sqrt{\pi_{\imath,\jmath}\pi_{,l}}}{2\sqrt{\Pi_g\pi_{\imath,\jmath}\pi_{,l}\Pi_t\Pi_m}}$$

$$= \sqrt{\Pi_j\Pi_k\Pi_n\Pi_t\Pi_m\pi_{\imath,\jmath}\pi_{,l}} \cdot \frac{1}{2\sqrt{\Pi_g\pi_{\imath,\jmath}\pi_{,l}\Pi_t\Pi_m}}$$

$$= \sqrt{\Pi_a\Pi_b\Pi_c\Pi_d\Pi_e\Pi_f\Pi_g\Pi_h}\sqrt{\Pi_a\Pi_b\Pi_c\Pi_d\Pi_e\Pi_f\Pi_g\Pi_h}$$

$$= 1$$

$$= \frac{\sqrt{\Pi_a\Pi_b\Pi_c\Pi_d\Pi_e\Pi_f\Pi_g\Pi_h}}{\sqrt{\Pi_a\Pi_b\Pi_c\Pi_d\Pi_e\Pi_f\Pi_g\Pi_h}}$$

$$= \frac{\sqrt{\Pi_a\Pi_b\Pi_c\Pi_d\Pi_e\Pi_f\Pi_g\Pi_h}}{\sqrt{\Pi_a\Pi_b\Pi_c\Pi_d\Pi_e\Pi_f\Pi_g\Pi_h}}$$

$$= \frac{\sqrt{\Pi_a\Pi_b\Pi_c\Pi_d\Pi_e\Pi_f\Pi_g\Pi_h}}{\sqrt{\Pi_a\Pi_b\Pi_c\Pi_d\Pi_e\Pi_f\Pi_g\Pi_h}}$$

$$= \sqrt{\Pi_i\bigl(1 - \bigl(\tfrac{1}{2} - \tfrac{1}{4}\bigr)\bigr)^2 \frac{\sqrt{\Pi_j\chi(j)}}{\sqrt{\Pi_m\chi(m)}}}\sqrt{\Pi_g\bigl(1 - \bigl(\tfrac{1}{2} - \tfrac{1}{4}\bigr)\bigr)^2 \frac{\sqrt{\Pi_h\chi(h)}}{\sqrt{\Pi_r\chi(r)}}}$$

$$= \frac{\sqrt{2\sqrt{\chi}}}{\sqrt{\chi}}$$

$$= \sqrt{\frac{\sqrt{\chi}}{\sqrt{\chi}} \cdot \frac{1}{\sqrt{\chi}} \cdot \frac{1}{\sqrt{\chi}}}$$

$$= \sqrt{\frac{\chi}{\chi \times \chi \times \chi}}$$

$$= \sqrt{\frac{1}{\chi^2}}$$

$$= \sqrt{1/\chi}$$

$$= \sqrt{\frac{1}{\chi}}$$

$$= \sqrt{\frac{1}{\chi}}$$

$$\sigma_z = \sigma_z^2 - \sigma_z \star \Sigma_{[n] \to \infty} - \left(\frac{1}{2} - \frac{1}{4} \right)^2 .$$

$$= \sqrt{\frac{1}{\chi}}$$