As I'm philosophically minded I sometimes play with fundamental equations to see if I can find anything that explains things that are hard. Now there was some ideas that come to my attention. First an interesting approach to model Maxwell's equations for source terms that moves at the speed of light. The paper: Restricted Maxwell. Accompanying this paper is a recent published book that seam to claim that it can connect these EM theory with QED book. I haven't read this book yet but I still want to speculate how to model QED from this EM theory. Here is a try,

Let's begin. We indicate with $\mathbf{A} = \sum_i \gamma_i A_i$ the potential from an external EM field. To indicate more generalized objects we use $\mathbf{V}$, in stead to indicate our working potential as the target of our analysis.

First note that if we take the total potential in the paper, there it decomposes as

$$\mathbf{V} = \sum_i \gamma_i V_i,$$

Where in the paper each V_i is identified as scalar field over C with V_1 the scalar potential and $V_i, i = 2,3,4$ The vector potential. The rule for yielding an EM theory is $D^2\mathbf{V} = 0$, with $D = \gamma \cdot \partial$. This is the same as $\Box\mathbf{V} = 0$. The claim in the paper is that this condition is enough to generate EM fields that produces $\mathbf{V}$. But not only this. The algebra works out for the case where V_i is matrices or vectors in stead of scalars. You just produces em fields according to the receip in the paper for each fixed coordinate in the matrix $\mathbf{V}_i, i = 1, ..., 4$ and each of them will yield the potentials,E field, B field, sources etc that all satisfies the Maxwell equations.

Now for any matrix solution $\mathbf{V}$, so that $D^2\mathbf{V} = 0$, we can take $\mathbf{V}_i = \frac{1}{4}\gamma_i^3\mathbf{V}$ and this defines the vector and scalar potentials matrices. That might have source terms that are conservative and move at the speed of light, hance for any matrix or vector $\mathbf{V}$, so that $D^2\mathbf{V} = \mathbf{0}$, we can describe the solution as EM fields. Byt for QED $D^2\Phi = C\Phi$. No the connection is diffrent,

Define [.] as $[.] = [.]^{(1)} + [.]^{(2)}$

$$[f(x)]^{(j)} = [f(x)]_k^{(j)} = -i\int f(\mathbf{e}\cdot\gamma)\exp(ik\mathbf{x}\cdot\mathbf{e})\,dC_{1,4}\ , j = 1,2\ ,$$

where is a wavelike 4-vector with the speed of light as a relativistic four vector $\mathbf{e}$ and for $i = 1, w = -1$, and for $i = 2, w = 1$ and that the measure is now defined. Let $e_{x_i} = e_t\eta_i$, with $|\eta| = 1$ and define the measure as $dC_{1,4} = \mathrm{sgn}(e_t)e_t^2 dS(\eta)d(e_t)$

We have,

$$D[f(x)]_k = ik[xf(x)]_k$$

and obviously

$$D^2[f(x)]_k = 0$$

So $\mathbf{V} = [.]_k$ are all representing possible matrix ensembles of EM potentials. The next step we shall consider is to use a special version of f, let

$$\mathbf{F}_{ak} = [\frac{1}{1+ax}]_k$$

Then we have the identity

$$a\gamma \cdot \partial \mathbf{F}_{ak} = ik[\frac{ax}{1+ax}]_k = ik[1]_k + ik[\frac{1}{1+ax}] = ik[1]_k + ik\mathbf{F}_{ak}.$$

Now, [1] is a scalar quantity. Ideally we would like this to be a constant but it's not. The goal however is to state the problem so that we can treat it as a constant.

Now the value of [1] is varying with the coordinate but the idea is that if we integrate a region of [1] in a local area at length scale $1/k$, it will in that area be the same as a constant all over the place. Likewise for derivatives, they will lead to a zero and hence

$$\int \mathbf{F}\, d\mathbf{x} = \int C.$$

Essentially This means that for length scales much larger than $1/k$ $\mathbf{F}$ behaves as a kind of constant energy content but with an intrinsic complexity. Now let's try to modulate $\mathbf{F}$ with a field with a more slowly varying distribution so that we again maintain the property that we have constant energy density. So we multiply [1] with $1+\Phi$ with the constraint that averaging in a local area gives again the same constant or

$$\int \mathbf{F\Phi}\, d\mathbf{x} = 0$$

Using the rules for $[f]$,

$$\mathbf{F\Phi} = [1]\mathbf{\Phi} + \frac{a}{k}(D\mathbf{F}))\mathbf{\Phi}.$$

Now,

$$\gamma \cdot \partial \mathbf{F} = ik[xf(x)] = ik[f(x)x] = [fD]$$

hence multiplying we see that we need to analyze

$$[fD]\mathbf{\Phi} = \int f(\gamma \cdot \mathbf{e})\gamma_i(\partial_i \exp(ik\mathbf{e}\cdot\mathbf{x}))\mathbf{\Phi} dC_{1,3}$$

Now an exchange of integral mean that we con focus to do the integration on $\mathbf{x}$ in a small region of one cycle. Now that integral of $\partial_i exp(i\mathbf{e}\cdot\mathbf{x})\mathbf{\Phi}$ If we conclude that we can use partial integration and skip the primitive part as it is small. Now for that cycle $\mathbf{\Phi}$ is constant or the error is of order $1/k|\partial_i\mathbf{\Phi}|$ so essentially

$$\int (\partial_i e^{ik\mathbf{e}\cdot\mathbf{x}})\gamma_i \mathbf{\Phi}\, d\mathbf{x} = \left[e^{ik\mathbf{e}\cdot\mathbf{x}}\gamma_i\mathbf{\Phi}\right]_{x_i}^{x_i+\ 2\pi/e_ik} - \int e^{ik\mathbf{e}\cdot\mathbf{x}}\partial_i\mathbf{\Phi}\, d\mathbf{x} = -\int e^{ik\mathbf{e}\cdot\mathbf{x}}\gamma_i\partial_i\mathbf{\Phi}\, d\mathbf{x}.$$

So the mean values that is indicated with an integral sign meaning

$$\int \mathbf{F\Phi}\, d\mathbf{x} = \int \left([1]\mathbf{\Phi} - \frac{ia}{k}\mathbf{F}D(\mathbf{\Phi})\right) d\mathbf{x}.$$

Another application of the same trick shows that

$$\int \mathbf{F}\mathbf{\Phi}\, d\mathbf{x} = \int [1]\Big(\mathbf{\Phi} - \frac{ia}{k} D\mathbf{\Phi}\Big)\, d\mathbf{x} + O(1/k^2).$$

Now for the integral to be zero in small regions it is enough to show that

$$[1](\mathbf{\Phi} - \frac{ia}{k} D\mathbf{\Phi}) = 0.$$

Doing the integral one show that if we average small regions of $\mathbf{x}$ $[1] = C_1$, with C_1 a constant so for $t > 0$, [1] is constant and you get the Dirac equation. Now a EM potential $\mathbf{A} = \sum_i \gamma_i A_i$ can of cause be added and if we assume that $[1] = 1/e$ then again we get QED with external Em field. The sign of the charge in QED depends on of if we use $\mathbf{F}(1+\mathbf{\Phi})$ or $\mathbf{F}(1-\mathbf{\Phi})$

To really set the equations equal to QED then we use

$$\frac{acm}{k} = \hbar.$$

Restructuring yields

$$a = \frac{\hbar k}{mc}$$

Now if we assume the energy relation $\hbar kc = mc^2$, then

$$a = 1.$$

To caluclate $\int [1]$, we will first note by the plane wave expansion to spherical harmonics theorem that,

$$\exp(ike_t\eta \cdot \mathbf{r}) = \sum_{l,m} C_{l,m} j_l(k|e_t||r|) Y_{l,m}$$

And because of orthoganality the integration with respect to $dS(\eta)$ is simply,

$$C_o j_0(k|e_t||\mathbf{r}|),$$

with $r = (x, y, z)$ and j_0 the spherical bessel function

$$[1]^{(j)} = -iC_0 \int j_0(k|e_t|r) \mathrm{sgn}(e_t) e_t^2 \exp(iwce_t t) de_t = \frac{C_0}{k} \int \frac{\sin(k|e_t|r)}{r} e_t \exp(iw^j ce_t t) de_t$$

Now the sinus function is fluctuating quite violently so we can fix e_t and for ecch fixed e_t integrate a region $dS(\mathbf{r}) r^2 d|r|$ and conclude

$$\int_{r_0}^{r_0 + 2\pi/(ke_t)} \frac{\sin(k|e_t|r)}{r} r^2 d(r) dS(\mathbf{r}) = \frac{2\pi}{k^2|e_t|^2}\, dS,$$

So we are left with

$$[1]^{(j)} = -i\frac{C_0 2\pi}{k^3}\int \frac{1}{e_t}\exp(iw^j e_t t)de_t$$

Integrating e_t and conclude from a foruier table that

$$[1]^{(j)} = \frac{C_0 4\pi^2}{k^3}H(w^j t),$$

with H the heaviside function, So remembering $w^2 = -w^1$ and therefore adding it all up,

$$[1] = \frac{iC_0 4\pi^2}{k^3}.$$

Finally let's interpret the Dirac spinor as a maxwellian interpretation, take

$$V = \Phi$$

Then

$$V_i = \gamma_i/4\Phi.$$

Then S as defined in the paper is

$$S = \frac{1}{4}\gamma_i\partial_i/\Phi = C\Phi$$

Hence

$$q = C\partial_t\Phi$$

and

$$j_x = C\partial_x\Phi$$

And we recognize that that the EM interpretation is somewhat coherrant to the traditional QM interpretation of charge and current.

Now for quantum electrodynamics $\Phi = S$ and $\Phi = V$ simultaniously and you could think about $D\Phi$ as the source terms but also $V = D\Phi$ is also satisfide by $D^2V = 0$, So, if you take a source term, gennerate a potential, get a new source term, generate a new potential and continue like this add infinitum and add all those together you get the sequece $I + aD + a^2D^2 + a^3D^3 + a^4D^4 + ... = (1 - aD)^-1$ this is the significans of the operator $f(x) = 1/(1 - ax)$ It is basically the end of a process. So you start with a rather even distribution of wave vectors representing length scale $1/k$. These are all seen as source terms, byt then they produce new EM fields which is fed in as source terms and so it goes on and on infinitely adding new stuff to the mix and in the end the result is $[f]$.

This last observation closes a circle of an idea that I had very long time ago. I was thinking that the world experienced a soup of waves going in all directions homogenously distributed in all space and that gravity is the result of shielding e.g. one obstacle shields another one and and there is a preassure that attracts them due to this. Now the $[f]$ is really just such soup and QED pops out from such an assumption. The question is if we can caluclate this attraction forece due to this shadowing.