**Title**:

Alternate light front quantization procedure for scalar fields

**Abstract**:

We propose a novel procedure for the light front quantization, where the Wightman functions play a crucial role. We do not demand that all fields should have their commutation relations on the $x^0 = 0$ hypersurface, thus we do not follow Dirac's method for systems with constraints and we do not need to impose any extra boundary conditions in order to solve constraints.

Instead we use only $T^{++}$ component of the energy-momentum tensor for fixing the commutation relations at $x^+ = 0$. Generally some degrees of freedom are absent at this step, which we interpret as their commutation relation is singular at $x^+ = 0$.

We impose the Lorentz covariance for fields and suppose that the vacuum state is translationally and Lorentz invariant. This leads to additional relations for the Wightman functions, which are extremely useful while determining their explicit form. We find that generally the Wightman functions are singular at $x^+ = 0$, but the singular terms have their general form and have only a trivial dependence on mass.

The next step is to introduce the annihilation and creation operators for the quantum field operator at the origin $x = 0$ in the most general way, which leads to the amplitudes of creation one-particle state of some 3-momentum by the field at some point. These amplitudes on contrary to the Wightman functions have no singularity, but unfortunately they are not Lorentz invariant.

We find the 3-momentum representation for the generators of translations in terms of the creation and annihilation operators. At last we find the representation of the quantum field operators at arbitrary point $x \neq 0$.

This procedure can be exactly implemented for any linear system i.e. for free fields.

We discuss two cases of scalar fields, one with the Klein-Gordon equation $(\partial^2+m^2)\phi = 0$ and one with the higher order equation $(\partial^2 + m^2)^2\phi = 0$.

We finally show how the scalar field which is mass independent at light front $x^+ = 0$ may have its Wightman function with a non-trivial mass dependence at light front $x^+ = 0$. This unusual property follows directly from to the Lorentz symmetry.