Hello. How do you do? I am Yuuichi Uda.
My presentation is the proposal of a new research methodology
which I named grammatical physics.
It can also be thought of as a proposal of a new research area.
I think that the grammatical physics
should become the mainstream of the fundamental physics in the 21st century
and that it will keep for about 100 years from now
as the guiding principle of the fundamental physics.
The grammatical physics is theoretical physics in a broad sense
but if we think of theoretical physics as the problem of mere modeling in a narrow sense,
the grammatical physics
is the new physics
which comes after the experimental physics and the theoretical physics.
I prepared the community site on the grammatical physics 'www.GrammaticalPhysics.ac'
beforehand.
I hope that every person who gets interested in the grammatical physics
will participate in this community.

My presentation consists of four parts.
The 1st part is the general explanation which shows what the grammatical physics is.
In each part from the second part to the 4th part,
I propose a concrete example to explain what the grammatical physics is.
At the second part, I propose a new grammar for the quantum mechanics.
At the 3rd part,
I try producing the new equation
which is based on the new grammar proposed in the second part
and show the scenario of how to construct a new theory in the grammatical way.
At the 4th part,
I apply the idea shown in the 2nd and the 3rd part to the quantum field theory
and propose the new frame in place of existing frame of the quantum field theory.

Now I start the first part.

First, what is the grammar?
For example, for the yesterday's diary,
it is ordinary language such as Japanese or English used to write it.
Ordinarily,
it is thought that the fact which is described by the yesterday's diary
is represented by which sentence
permitted by the grammar of Japanese or English
should be chosen
and it never is thought that the fact is represented by the grammar of Japanese or English,
but in fact,
the fact described by the yesterday's diary
also has the feature that it is describable in Japanese or English.
This means that it may be describable neither in Japanese nor in English
if the fact was not so,
and here is a room for occurring of necessity to invent new grammars.
The grammatical physics
is such a methodology to develop physics
as we use invention of a new grammar
which fits the real situation better than the existing grammar
as a driving force
after supposing actively that existing grammar doesn't fit real situations completely.

Well, what is the grammar in the physics?
It is a coordinate system.
But, I use the word 'coordinate system' in a little broader meaning
than the ordinary meaning.
The coordinate system which I say
is a general mapping
which maps a mathematical notion to a physical notion.
Specifically, as the coordinate system of a physical theory,
I think of a mapping which maps a mathematical notion to a history of the physical system.

For example, a physical unit is a coordinate system in Uda's broad meaning.
It is because the unit of length cm
can be thought of
as the mapping
which maps each non-negative real number x to a length x centimeters
and the unit of time s
can be thought of
as the mapping
which maps each non-negative real number t
to the time t seconds.

By using the unit of length cm and the unit of time s,
I define the Cartesian coordinate system D and the time coordinate system ‘clock’
as shown in the figures.
The Cartesian coordinate system D
is the mapping
which maps each real row vector (x,y,z) with three columns
to a spatial point whose Cartesian coordinate is (x,y,z),
and the time coordinate system ‘clock’
is the mapping
which maps each real number t
to the time later by t seconds than the arbitrarily given original time.
Therefore, Both D and clock are coordinate systems in Uda’s broad meaning.
As the coordinate systems of the physical theories,
we can mention the coordinate system of the classical mechanics for a massive point particle
and the coordinate system of the quantum mechanics
for the same physical system.
The coordinate system Mc of the classical mechanics for a massive point particle
is defined as the mapping which maps each function χ from R to R^3
to a history Mc(χ) of the position of the particle
by using D and clock
where Mc(χ) is the following proposition.
“For any real number t, the position of the particle is D(χ(t)) at the time clock(t).”
The coordinate system Mq of the quantum mechanics for a massive point particle
is the mapping which maps each function Ψ from R^4 to C
to a history Mq(Ψ) of the quantum state of the particle
where Mq(Ψ) is the following proposition.
“For any real number t,
the quantum state of the particle is state(Ψ(□,t)) at the time clock(t).”
Please notice that in the above statement
Ψ(□,t) is the mapping of R^3 to C which depends on Ψ and t
and is defined by the equation [Ψ(□,t)](x,y,z)=Ψ(x,y,z,t)
and ‘state’ is the mapping which maps each function from R^3 to C
to a quantum state
and is a coordinate system in Uda’s broad meaning.

The core of the development of the physics
to the quantum mechanics from the classical mechanics
is that the coordinate system was changed into Mq from Mc.
That is to say, it is the development of the grammar.
Therefore,
the grammatical physics at present
is specifically the work
that after inventing the more powerful coordinate system
than Mc and Mq essentially,
one builds up further development of the physics on it .

However, that is not all of the grammatical physics.
The grammatical physics contains all interests about the features of the nature
at grammar level.
The more difficult and higher-grade problem of the grammatical physics
than invention of new coordinate systems
is to invent the more powerful new set of notions
that should take the place of the set of the notions:
history, coordinate system and equation.
To expose the essential weak point
of the set of notions (history, coordinate system and equation)
without depending on those specific choices
is also a problem of the grammatical physics.
In comparison with these problems,
invention of new coordinate systems is no more than an inferior problem, mere model choice.

So much for the 1st part of my presentation.