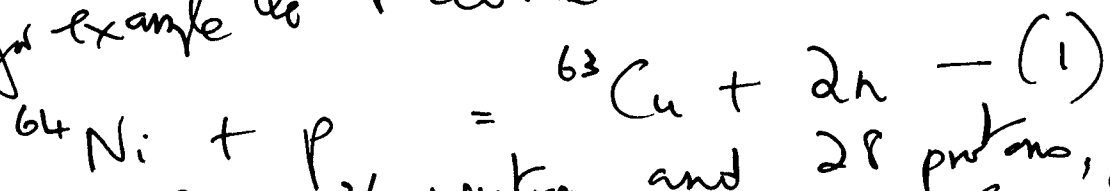


226(1) : Theory of Low Energy Nuclear Reactions

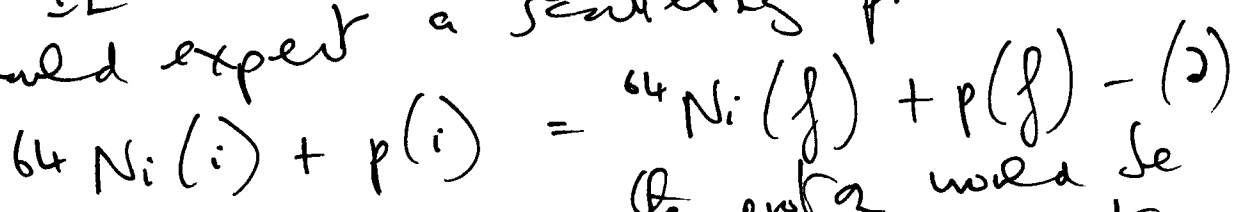
In order to construct the simplest possible theory of such reactions we use UFT 181 and UFT 182.

Consider for example the reaction:



Here, ${}^{64}\text{Ni}$ has 36 neutrons and 28 protons, and ${}^{63}\text{Cu}$ has 34 neutrons and 29 protons. So ${}^{64}\text{Ni}$ is transmuted into ${}^{63}\text{Cu}$ with the release of two neutrons. The problem is how does the proton (i.e. H nucleus) interact with the ${}^{64}\text{Ni}$ atom to cause transmutation.

In classical physics (standard model) we would expect a scattering process:



and no transmutation, i.e. the proton would be repelled by the ${}^{64}\text{Ni}$ nucleus, and no neutrons would be released. However, in LENR, the nickel is transmuted to copper with release of neutrons and energy. The energy is used in commercially available devices as a safe source of power.

Consider the theory of UFT 181:

$$2) \quad p^\mu \rightarrow p^\mu - \hbar \kappa^\mu \quad - (3)$$

is related a four momentum p^μ interacts with the matter wave κ^μ . This is a minimal prescription.

The Einstein equation: E^2

is changed to the relativistic Hamilton Jacobi equation:

$$(p^\mu - \hbar \kappa^\mu)(p_\mu - \hbar \kappa_\mu) = m_0^2 c^2 \quad - (4)$$

Now use:

$$p^\mu = i\hbar \partial^\mu \quad - (5)$$

$$\text{to obtain:} \quad \left(\square + R_1 + \left(\frac{m_0 c}{\hbar} \right)^2 \right) \psi = 0 \quad - (6)$$

$$\text{where} \quad R_1 = \left(\frac{m c}{\hbar} \right)^2 \quad - (7)$$

Here m is defined as relativistic mass, as in UFT 181 and UFT 182:

$$m = \frac{\hbar}{c} \left(\frac{\omega^2}{c^2} - \kappa^2 \right)^{1/2} \quad - (8)$$

and in ECE theory is a property of spacetime.
Therefore it is relativistic (1),

3) The effective mass of ${}^{64}\text{Ni}$ is:

$$M^2 = m^2 + m_0^2 \quad - (10)$$

where m is its interaction mass and m_0 is its rest mass. Therefore if ψ is the nuclear wave

function:

$$\left(\square + \left(\frac{Mc}{\hbar} \right)^2 \right) \psi = 0 \quad - (11)$$

where

$$\square = \frac{1}{c^2} \frac{\partial^2}{\partial t^2} - \nabla^2 \quad - (12)$$

If the wavefunction ψ has no time dependence then:

$$\left(-\hbar^2 \nabla^2 + M^2 c^2 \right) \psi = 0 \quad - (13)$$

or

$$-\frac{\hbar^2 \nabla^2}{2M} \psi + \frac{Mc^2}{2} \psi = 0 \quad - (14)$$

The non-relativistic limit of eq. (11) is the free particle Schrodinger equation:

$$\frac{\hbar^2 \nabla^2 \psi}{2M} = -i\hbar \frac{\partial \psi}{\partial t} \quad - (15)$$

which can be written as:

$$\hat{H} \psi = E \psi \quad - (16)$$

4) where $\hat{H} = -\frac{p^2}{2M}$ — (17)

is the Hamiltonian operator. The classical limit of eq. (16) is:

$$E = T = \frac{p^2}{2M} = \frac{1}{2} M v^2$$

— (18)

So the ^{64}Ni atom has kinetic energy:

$$T = \frac{1}{2} (m^2 + m_0^2)^{1/2} v^2$$

— (19)

during the reaction, where:

$$m^2 = \frac{p^2}{c^2} \left(\frac{\omega^2}{c^2} - k^2 \right)$$

— (20)

has been obtained from spacetime. Here:

$$k^\mu = \left(\frac{\omega}{c}, \underline{p} \right)$$

— (21)

is a wave four-vector of spacetime.

This kinetic energy of spacetime results in the nuclear reaction (1) and release of energy — an exothermic reaction