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Acceleration Methods of *Itonic* Clusters

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Abstract

A new state of atomic clusters can be easily generated by electric discharges. Since Electro-Nuclear Reactions (ENRs) could occur in the cluster, new physics could be expected with an accelerated beam of the clusters. Here, two acceleration methods of the clusters will be proposed by using linac.

1. Introduction

In the 20th century, linacs have been amazingly progressed. Their performance was described by two basic parameters of acceleration energy and a current of particles. A further development in the directions will somewhat continue in future. But considering limits of its technology and cost, a new direction would be developed: linac of accelerating atomic clusters. Then, the performance of linac will be described by three basic parameters: the number of atoms involved in a cluster should be newly added to the two parameters. There, methods of bonding cluster atoms would be one of the most critical problems.

Recently, the author discovered a new state of clusters of mainly hydrogen atoms during the study of so-called Cold Fusion (1, 2). The clusters, called itonic clusters, could exist for a moment as stable bodies and run around in air or underwater. Their curious behavior very resembled to Ball Lightning (BL) which was often observed in the natural environment. Itonic clusters were alternatively called micro BL. Since itonic clusters were negatively charged, they would be effectively accelerated to a high energy by linac in order to open new physics in future.

2. What is *itonic* cluster

During an electrolysis or discharge, many electrons could be charged on atomic clusters which were formed in or on metal electrodes. Then a portion of the electrons should have been scattered out but the remained electrons could have been interconnected each other and formed a network. The network of those electrons strongly compressed the atomic cluster inwards to make it shrink. In the cluster, nuclear reactions could take place, called Elecrtro-Nuclear Reactions. No acceleration process of particles was needed to induce ENRs, unlike conventional nuclear reactions of charged particles. Since they could occur in the strongly coupled multibody system, ENRs were completely different from conventional ones. There were several kinds of ENR which were found so far, as follow,

a. a new fusion reaction of producing He-4 from two deuterons, but with no gamma rays
b. sequential captures of protons/electrons to contribute nuclear transmutation (ENT)
c. multibody fission reactions
d. generation of little neutron star
e. electro-nuclear collapse (ENC)
f. electro-nuclear regeneration (ENG).

Among ENRs, ENC was the most significant nuclear reaction. Many beautiful pictures which clearly indicated ENC were taken in previous

experiments (3).

It was made clear by Underwater Spark Discharge (USD) experiments that there are two types of the itonic clusters: ball and ring. The ball cluster with a strong compression could induce ENC and ENG. On the other hand, the ring cluster decayed to an almost hexagonal plate, during which ENT could occur as well.

3. Generation of *itonic* clusters

A method of USD was one of the most effective methods for generating itonic clusters. The details of USD were examined by the author (4). A very high current should have been required to induce ENRs with electrodes of usual dimensions, but a very easy and cheap device of USD was made possible by using thin wire electrodes.

During USD, thin wire electrodes such as cadmium and nickel were immersed in an electrolyte solution such as potassium carbonate. Discharges were made between the electrodes under continuous DC or pulsed AC modes. A key point of USD was to make a pinch effect work well on the surface of thin wire electrodes. The I/V curve showed a strong non-linearity having three typical regions. In the highest voltage region, the pinch effect worked well so that the current was strongly suppressed. Tiny sparks and weak lightning appeared on the surfaces of a cathode and an anode, respectively. The tiny sparks were found to be consisted of many itonic clusters which were often ball clusters. Weak lightning were caused by break up of ring clusters on the anode.

4. Acceleration methods of *itonic* clusters

Here two different methods of obtaining accelerated itonic clusters will be proposed.

4.1. Acceleration of itnoic clusters

Since itonic clusters were sufficiently stable and negatively charged, it would be not difficult to accelerate them by linac. A system of linac would be consisted of three main parts: source of itonic clusters, pre-acceleration and acceleration by linac. In the second part, itonic clusters could be collected or somewhat accelerated by a static electrical field for the separation with a different ratio of e/m.

4.2. Itonization of accelerated protons beam

An alternative generation method of accelerated itonic clusters would be itonization of accelerated protons. Figure 1 shows a conceptual view of the acceleration of itonic clusters. First of all, a beam of protons with a high energy should be provided by linac. Many electrons could be charged to the proton beam harmonically. Then, since the protons should be bunched in a narrow space, they could be effectively itonized with many electrons. After that, the selection could be made for obtaining clusters with the same e/m.

5. Discussion

The accelerated beam of itonic clusters would open new physics as well as industrial applications in future.

For example, a bombardment between tiny black holes would be possible in laboratory. We would obtain valuable information about that could contribute to our understanding the universe.

References

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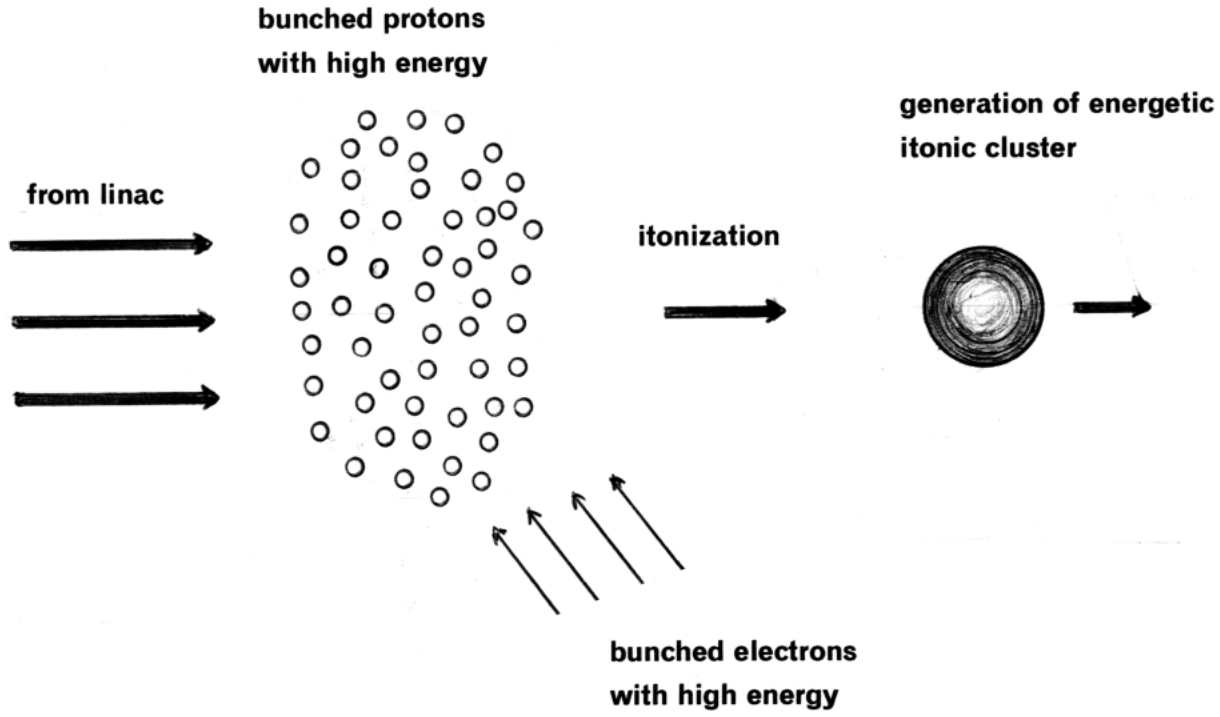

Fig. 1: Conceptual view of acceleration of itonic clusters