



The Implementation of the Alternative Fusion Reactor Project

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Abstract

As it is known, the main efforts of the international community to solve the problem of controlled thermonuclear fusion are concentrated mainly on the International Thermonuclear Experimental Reactor (ITER) project. The achievement of positive results in this project is still very problematic. Experimental data show the absence of plasma retention in a stable state. The effectiveness of the magnetic field is limited only by heating the plasma, but not by its retention in a stable state, and at the moment it is an indisputable experimental fact.



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High-Temperature Plasma;
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Introduction

Controlled thermonuclear fusion, included in the list of critical technologies of the world, does not even need a detailed description, since such energy is capable of providing stable coverage of rapidly growing energy costs for many years to come. For the world economy, the growth of the global energy deficit is not only a challenge, but also a tremendous opportunity, a chance for the development of new sectors of the economy, because in a few decades the global energy sector will be different, not only quantitatively, but, most importantly, qualitatively, with the loss of the dominant importance of the oil and gas sector.

The implementation of controlled thermonuclear fusion is uniquely associated with the achievement of stable states of high-temperature plasma.

Due to the impossibility of symmetric target compression and the low efficiency of laser devices, the projects of inertial synthesis are also unsuitable. These circumstances strongly indicate the need for research within the frames of alternative projects to which this project belongs. Our project is based on a method unparalleled in the world practice of the formation of stable states of a thermonuclear plasma, allowing in principle to solve not only the problem of heating the plasma to initiate the thermonuclear

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reaction, but also its retention until thermonuclear fuel is completely burned out

Methodology

The basis of this project is the use of the properties of gravitational radiation as radiation of the same level as electromagnetic radiation, which is described in detail in^{5,6,7,8} To excite and amplify gravitational radiation in a thermonuclear plasma, the presence of multi-electron atoms in the working composition is necessary. This makes it possible to realize a resonance between the energy levels of a gravitationally excited electron and the excitation energy of an electron in an atom.

Then the set of actions for compression of thermonuclear plasma will be as follows:

- a) Preheating and acceleration of plasma by pulsed high-current discharge current.
- b) Injection of plasma from an accelerating magnetic field

These actions can be implemented in the original design of the pulsed high-current discharge device (Fig. 1, created and tested at the Research Institute of Experimental Physics, Sarov; the design of the installation fully complies with the above conditions).⁴

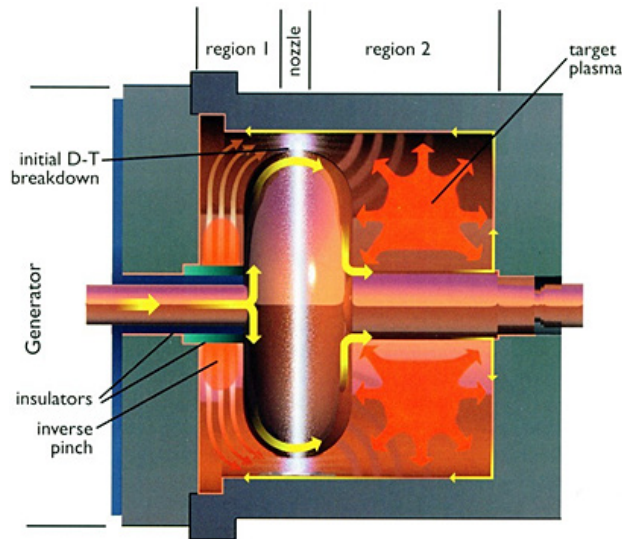


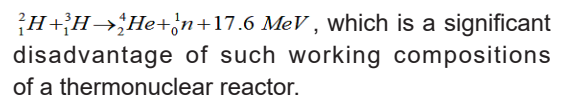
Fig. 1. The design scheme of a two-chamber installation of a high-current pulse discharge in the future. Two options for the functioning of a two-chamber pulse discharge make sense.

In such a discharge, during the formation of a plasma of multicharged ions and the further conversion of the energy of the plasma into the thermal energy of the plasma, conditions are provided for the excitation of gravitational radiation and its transition to the long-wavelength part of the spectrum, followed by plasma compression

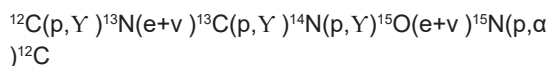
Two options for the functioning of a two-chamber pulse discharge make sense.

- a) Composition with hydrogen isotopes (d+t) + multi charged atoms. , ensuring the achievement of stable plasma states for the course of

thermonuclear reactions. In this case, neutrons are formed during recombination



- b) The use of a carbon cycle leading to the formation of helium in reactions with catalysts. In the carbon cycle of CNO, reactions occur sequentially, which leads to the conversion of hydrogen into helium. Carbon is used as a catalyst. This cycle briefly has the form



The result of the carbon cycle reactions is the formation of α - particles (4He) from four protons in the absence of neutrons in the final composition of the reaction products.

Unlike the synthesis of hydrogen isotopes, 25 MeV is released in carbon cycle synthesis reactions and only a small part of the energy is accounted for by neutrinos. In nature, the carbon cycle is realized in stars. At the same time, the cross sections of the reactions of proton-proton and especially carbon-nitrogen cycles increase with temperature, which leads to a sharp increase in the rate of reactions of various cycles and, consequently, to an increase in the rate of energy release. This circumstance makes it possible to realize the necessary rate of carbon cycle reactions due to the corresponding volt-ampere characteristics (VAC) of the discharge.¹¹

Conclusion

As a basic design of thermonuclear reactor it is necessary to use designs of pulsed high-current discharges of the two-chamber type. A demonstration version of such a reactor may be the MAGO chamber already tested on a pure deuterium-tritium mixture.

The thermonuclear plasma should contain several varieties of multiply charged ions.

Their concentrations and serial numbers should be such that (using the resonance of the spectra

of energy levels) there will be the population inversion along the spectrum of stationary states of an electron in its own gravitational field.

The experimental refinement of the quantitative composition of the working gas and its coordination with the current-voltage characteristics of the discharge will be the content of the next stage of work including the accompanying sections of diagnostics and theoretical calculations.

In experiments with the registration of characteristic radiation of dense high-temperature plasma with an admixture of polyatomic elements, both the presence of microinches and the expansion of radiation lines unpredictable by electrodynamics are recorded.⁹ But these results are quite consistent with the theoretical foundations of the proposed compression principle. Such results are recorded especially intensively in experiments with the Z-machinex⁸ (Sandia National Laboratories, USA) and in the spectra of the characteristic learning of stars. Their correct interpretation is inevitable and it will definitely lead to the developed ideas.^{1,2,3,12}

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Conflict of Interest

There is no conflict of interest.

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