

provisionary

The preliminary work ~~that~~ on the possibility of producing a self perpetuating nuclear chain reaction in ^(a mixture of lead and carbon) uranium seems in our opinion to be encouraging and to warrant the organization of experiments on a wider scale ~~for the purpose of~~ ^{according to the following plan:}

a) perform a number of measurements and preliminary researches for the purpose of improving the estimate of the chances of success and of enabling us to ^{find the best possible conditions for} plan in a detailed form the large scale experiment. *Lawrence*

b) on the assumption that this preliminary research should give ~~xxxx~~ a satisfactory result, perform an experiment for the actual production of the chain reaction. *details*

In support and explanation of these proposals we submit the following considerations.

A forecast whether or not a chain reaction would be self perpetuating under given circumstances can be made only with the knowledge of several nuclear constants related to the fission process of uranium and to the process of slowing down of the neutrons in carbon. These constants ^{could} ~~have~~ so far been ^{only indirectly determined by experiment} measured with a very poor accuracy and therefore any forecast that can at present be made is affected by a very ^{low} ~~appreciable~~ ^{considerable} probability of error. Taking for these constants what now appear to be the best values the experiment ought to be successful; but, for the reasons mentioned above this statement means only that at present ^{it appears more} the favorable ^{chances are better than 50 percent.} ~~chances are better than 50 percent.~~

^{those various factors.} It is mainly due to this state of affairs that ~~xxx~~ it seems advisable, before embarking on the final experiment, which will certainly involve a very considerable expense, to carry out a preliminary program as outlined under a). The very nature of the measurements involved does not make us very hopeful to be able, after completion of this stage of the program, to predict with certainty the outcome of the experiment. But we shall then be in a better position ^{to} ~~for~~ estimating the chances and

to determine the most favorable geometry for the final experiment. The estimated expense for part a) of our program is of *about \$ 50,000*.

Part b) of the program will involve a much greater~~x~~ cost since very large amounts of materials (of the order of 100 tons of graphite and ⁻²⁰⁰ 10⁻²⁰ tons of metallic uranium) will have to be used. The total cost may be as high as

perhaps \$ 500,000

The program that we suggest presents however the advantage that the actual expenditure for this second part will be incurred only if the results of the preliminary part are encouraging.

Dear Dr. Sachs:

In July last year I informed you that I had invented a method of maintaining a chain reaction which would make it possible to utilize the liberated energy for purposes of power production. This method was based on the idea of using carbon for slowing down the neutrons rather than water. The scope of applications appeared to be limited, but an important naval application seemed possible.

On the initiative of Prof. Wigner and Prof. Einstein the Government was informed through your good offices, and at your suggestion I submitted a memorandum to the Special Advisory Committee appointed by Pres. Roosevelt in October last year.

I wish now to raise the question whether I ought to look forward to continue this line of research in some form of collaboration with the Government, or whether I may consider myself free to approach other agencies. In this connection I wish to state that in Febr. I described the proposed method in detail in a paper which has been accepted by Physical Review, and I have to decide now whether I should ask that the publication of this paper be postponed.

The best way of organizing the further development along this line would perhaps be the following: A fund could be established under trustees who ~~would be chosen~~^{selected} by the Special Advisory Committee, but otherwise ~~would not be~~^{the fund} under the control of the Government. One of the various forms suitable for a tax-exempt non-profit organization could be ~~chosen~~ chosen. If such a fund were established Prof. Fermi and I would be glad jointly to act as secretaries and to assume the corresponding responsibility for seeing to it that the required experiments

be carried out. We have drawn up a plan for such experiments and an estimate of cost could be given if required.

~~The ~~main~~ ~~commercial~~ ~~question~~ ~~is~~ ~~whether~~ ~~the~~ ~~Government~~ ~~is~~ ~~sufficiently~~ ~~interested~~ ~~to~~ ~~take~~ ~~action~~ ~~in~~ ~~the~~ ~~matter~~~~

I personally do not see my way.....

The first question which requires an answer is whether the Government is sufficiently interested in the matter to take In that case decisive action now. We have to consider two possibilities:

a) whether the Government would be willing to contribute to the fund mentioned above. If so, there may be formal dif-

iculties due to general Government regulations. *In that case I wonder whether*

I wish to raise the question whether
~~then~~ such formal difficulties could be overcome by the following procedure: I take out patents for the inventions involved, and I could assign these patents to the Government. The Government could then, in consideration for these assignments, pay me the amount of \$ 1.- *also but,* and ~~put~~ at the disposal of the trustees chosen by the Advisory Committee ~~£~~ a certain sum. If this should provide a way out of formal difficulties, I should be very glad to take action along this line.

b) If the Government is not willing

Statement on procedural aspects and secrecy.

If we take it for granted that it will be possible to maintain a chain reaction in a system composed of uranium and carbon, the first question which arises is the following:

1. Does the Government consider this fact to have an important bearing on questions of national defense? If the answer to this question is positive, then it is obviously important that the Government should be in a position to secure, if required, an adequate supply of uranium from abroad. This will only be possible if

a) the Government finds ahead of foreign governments that uranium can in fact be used for certain specific purposes in connection with national defense;

b) if this fact is kept secret at least long enough to enable the Government to secure an adequate supply of uranium from abroad, for otherwise foreign governments will contract the uranium coming from Canadian or Belgian sources. In view of the progress of the war and the danger of its assuming a totalitarian form, we cannot exclude the possibility of reverses to the Allies, leading to a domination of ~~South~~ Africa, including Belgian Congo, by the Axis Powers. Hence, the urgency for decision and for assuring the conditions conducive to speedy and secret work.

Lesson depends on development of war

→ Why prohibit ~~stage reached~~ Revering now Plowch

*Lesson requires secrecy [cond.]
State of affairs now
Pro-Douco*

STATEMENT

We may expect that it will be possible to maintain a chain re-
action in a system composed of uranium and carbon. ~~We have to de-~~
cide whether the bearing of this fact on questions of national
defense is considered important or whether it is not. ~~If the~~
~~matter is held important from this point of view then we have to~~
~~consider the following:~~ ~~then the following~~ ~~is~~ ~~the~~ ~~following~~
~~is~~ ~~the~~ ~~following~~ ~~is~~ ~~the~~ ~~following~~

Whether or not it will be possible for the United States
Government to secure an adequate supply of uranium ~~will~~ ^{may} depend
upon whether or not the Government of the United States knows
ahead of other governments with a fair degree of certainty that
uranium can in fact be used for purposes of national defense and
takes steps to secure such a supply abroad. The reason for this is that the supply of uranium will probably
have to be secured ~~from abroad~~ either from Canada or from Belgian
Congo the latter being approximately the more important source.
This is obviously impossible if other governments act ahead of
the United States Government. The matter would appear of particu-
lar urgency if one wishes to take into account the possibility of
a defeat of the Allies by Germany and Italy leading to a domination
of Africa and the possession of Belgian Congo by the victors.

It should be mentioned that uranium occurs in the United
States chiefly in the form of carnotites which is an ore poor in
uranium and which is at present mined for the sake of its vanadium
content. The total deposit is estimated to contain 3,000 tons
of uranium oxide. It may be that some home production of uranium
could perhaps be organized by until such time as that is done the
United States will be dependent on imports from one of the two
above-mentioned sources and these might easily be cut off if other
governments move more quickly.

At some point it would be

*If the past considerations of importance there are some have
the policy be emphasized the following points:*

..... At the meeting of the Advisory Committee appointed by the President, which was held on October 21 last year, I submitted a report giving such information as was available and making certain recommendations concerning the furtherance of the experimental work and the study of potential possibilities for obtaining later a supply of uranium for the United States Government. At that meeting the representatives of the Government expressed their willingness to help in the way of supplying certain materials, but it did not appear possible to obtain through them the other required facilities. I understand that they submitted a report to the President making recommendations as how to remedy the situation.

Since I did not want to approach industrial firms or other agencies until the Government had ample opportunity to decide whether it wanted to assume responsibility for the continuation of this work, and since the funds which my friends had privately contributed were exhausted, the work was at a complete standstill in the eight months ^{experimental} between July last year and February this year. When in the five months which followed the October conference, no information concerning the attitude of the Government towards this line of work was forthcoming, I wrote a detailed paper which has been accepted for publication by the Physical Review, describing in detail a method by which a chain reaction can be maintained in a system composed of carbon and uranium under conditions which would make it possible to utilize such a chain reaction for purposes of power production. I have given much attention to question relating to the transformation into power of the energy liberated in the chain reaction as well as to questions relating to the regulation of the chain reaction and have devised methods which seem to solve the problem of heat transfer and the problem of ~~xx~~ controlling the chain reaction.

The question whether a nuclear chain reaction can be maintained in a system composed of uranium and carbon can be determined beyond doubt only through carrying out a large scale experiment. Since it appears necessary and urgent to obtain certainty in this matter we desire to start organizing such a large scale experiment. This experiment will ultimately require the use of about 100 tons of graphite and perhaps 10 to 20 tons of uranium metal. It would also require an elaborate

~~perhaps 10 to 20 tons of uranium metal. It would also require~~
elaborate mechanism designed to stabilize the chain reaction and to safe-guard against over-heating and the possibility of an explosion. Realizing that this is an enterprise which may require to its conclusion an expenditure of \$200,000. to \$500,000. we propose to carry out this project by stages. If the results obtained during the first stage are satisfactory then the expenditure necessary for the second stage would appear to be justified and the second stage could be started according to schedule, etc. If this procedure were adopted then the expenditure would gradually rise parallel to the increase in our assurance of the ~~ultimate~~ smooth-functioning and final success of the large scale experiment.

In the first stage we would desire to carry out a general survey of all nuclear constants involved with a view to confirming the values previously obtained and to narrowing down the limits of experimental error of the observed values of these constants. A successful conclusion of this survey would strengthen our assurance of ultimate success in the experiment and would enable us to find the optimum conditions ^{for} ~~under which~~ the large scale experiment. Concurrently, with this survey, certain other work would have to be done in order to prepare the ground for the large scale experiment. Such work would include the working out of constructional details in the form of drawings, the carrying out of technological tests on samples of material which will be used in large quantities in the ultimate experiment, and negotiating for bids for the manufacture of such material in the required quality and quantity. An expenditure of \$50,000. would probably be sufficient to bring this first stage in the organization of the large scale experiment to its conclusion and would bring us up to the next stage

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During the second stage of the work the expenditure would gradually rise and may reach a total of \$500,000. by the time the large scale experiment is concluded.

~~The engineering development proper which would include the energising of a steam boiler by the heat liberated in the chain reaction and the adaptation of such an atomic engine for the purpose of driving naval vessels is not included in this estimate of cost. Such an engineering development would probably require a frame-work which is different from the frame-work which is best suited for carrying out the first large scale demonstration.~~

~~[Handwritten signature]~~

Dear Dr. Sachs:

I am referring to the letter which Prof. Einstein has written to you on March 7, raising certain questions, and in accordance with his letter I am sending you enclosed a memorandum giving you further details on the subject.

At the same time I feel that I ought to make my own position perfectly clear so as to avoid any possible misunderstanding, ~~as to where I personally stand in the matter.~~

In July last year I informed Dr. E.P. Wigner and Dr. Albert Einstein, both of Princeton, N.J. that ^{I saw a memo} ~~there is~~ ^{as} a very good ~~chance~~ of maintaining a chain reaction in a system composed of uranium and carbon, and that this fact ^{appeared to have a direct} ~~has a~~ bearing on questions of national defense. ^{asked that felt that} Dr. Wigner strongly emphasized the necessity of ^{ought to be informed} ~~informing~~ the Administration, and when you kindly offered your help in July last year, Dr. Einstein submitted the matter through your good offices to the President. At the meeting of the Advisory Committee appointed by the President, which was held on October 21 last year ^{that} At the ~~October~~ meeting the representatives of the Government ~~appeared to take a favorable view with respect of the suggestions that were put forward, but made it clear that the~~ ^{old by} Government regulations limited the power to help. These representatives expressed their willingness to help in the way of supplying certain materials, but it did not appear ~~to be possible to obtain~~ ^{through them} the other required facilities. ^{I understood that they} ~~through the Government~~ ^{and} ~~commendation to remedy this situation has been made, but~~ ⁱⁿ the five months which followed the conference no information reached me concerning the attitude of the Government, towards ^{this line of work} ~~this recommendation~~ ^{to which we attempted to call her attention} ~~to which we attempted to call her attention~~ ^{commendation}. In the eight months between July last year and Febr. this year, the experimental work concerning chain reactions con-

I informed Dr. Wigner and Dr. Einstein of my intended publication, and Dr. Einstein wrote you a letter raising the question whether the publication of this paper ought to be ~~xxxx~~ delayed. As you will see from the enclosed correspondence, I have raised this question of delaying publication in February last year, but only if the Government were to support the policy of delaying publications, which I then suggested, could it be hoped that this policy would find general acceptance. This question of delaying publications now requires a decision which ought no longer be postponed.

Dear Dr. Sachs:

I am referring to the letter which Prof. Einstein has written to you on March 7, raising certain questions, and in accordance with his letter I am sending you enclosed a memorandum giving you further details on the subject.

At the same time I feel that I ought to make my own position perfectly clear so as to avoid any possible misunderstanding as to where I personally stand in the matter.

When I realized that there is a very good chance of maintaining a chain reaction in a system composed of uranium and carbon and that this fact has a bearing on questions of national defense, I communicated with Dr. Wigner of Princeton and Prof. Albert Einstein on this matter. On Dr. Wigner's initiative it was decided to inform the Administration, and when you kindly offered your help in July last year, Prof. Einstein submitted the matter to Pres. Roosevelt through your good offices. At the meeting of the Advisory Committee, appointed by Pres. Roosevelt, which was held on October 21, last year, I submitted a report giving such information as was available and making certain recommendations concerning the furtherance of the experimental work and the study of potential possibilities for obtaining later a supply of uranium for the United States Government.

In the eight months between July last year and February this ~~year~~ ^{the} experimental work ^{along the indicated lines} was at a complete stillstand. No communication reached me from ~~Washington~~ the Government in this matter, leaving me in doubt both whether any action has been taken following the conference in October and also as to the question whether my further cooperation in this matter was desired.

Statements concerning the large scale experiment.

The work of Fermi and Szilard has now reached the stage at which it is necessary to start organizing a large scale demonstration experiment. It is not contemplated actually to place any orders for this large scale experiment within the next six months or one year. This time interval ought to be used to remeasure all nuclear constants which enter into the large scale experiment, since the exact knowledge of the value of these constants will make it possible to find the best conditions under which the large scale experiment can be carried out.

If a fund of \$ 50,000 were available, four younger physicists could be employed for carrying out this survey which would include:

1. an improved estimate of the number of fast neutrons emitted by uranium per absorbed thermal neutron (μ);
2. a study of the resonance absorption of uranium (p);
3. study of metallurgical problems connected with the large scale manufacturing of uranium metal;
4. cross-sections of uranium for thermal neutrons;
5. slowing down process in carbon;
6. measuring of combinations of nuclear constants in experiments in which a uranium metal sphere is embedded in graphite;
7. constructional details for the large scale experiment.

It is proposed that three fourths of the fund be used for ^{work preparatory} the preparation of the large scale experiment in a system composed of uranium and graphite, and one fourth of the fund be used for another line of research which, if successful, would lead to another type of chain reaction.

The question whether ~~a~~^{or not} nuclear chain reaction can be maintained in a system composed of uranium and carbon can be determined beyond doubt only through carrying out a large scale experiment. Since it appears necessary and urgent to obtain certainty in this matter we desire to start organizing such a large scale experiment. This experiment will ultimately require the use of about 100 tons of graphite and perhaps 10 to 20 tons of uranium metal. *I*t would also require **an** elaborate

I should not expect to be of any business

The Experiments carried out on four tons of graphite, which was put at our disposal by the Government) ^{the history} show that the absorption of carbon for thermal neutrons is very small. The value obtained is about one-third of the upper limit which had been previously reported, ~~and it is conceivable that part of this observed absorption is due to moisture and other impurities.~~ This experiment is now concluded and will not be repeated except within the frame-work of a general survey of all nuclear constants involved. ^{have} We propose to carry out such a general survey if the necessary funds can be obtained.

The value is not right

It had been generally held that

Low work and usually even of such a nature that we regard that as concluded & as giving us the true value of the effect

~~As to the scale of the work it is not a simple matter~~

~~Statement concerning two stages~~

But they from this stage it is correct & we are satisfied that the work moved to (see) a letter

to _____ The rationale of that procedure of the unindicated character of the work & so far we have felt in the supplementary its separate statement

It is re-commended that:

1. An advisory committee on special scientific problems be appointed and include the governmental members of the present committee ~~and include~~ and include in addition, Professor Pegram, Professor Einstein, Dr. Alexander Sachs, (and Professor ^{Harold} Urey.)
2. That the non-governmental members of this committee be authorized to act as a board of trustees for a foundation or council for physical research and that further persons to serve as trustees be co-opted ~~with~~ with the approval of the President or the governmental group of the advisory committee. It should be made the task of this council ^(which is to act as a new project) or foundation to explore the uranium situation in all its aspects. ^{134 should receive such} The treasurer of the council would function under the government committee and is to be bonded. It is not intended that the council should be the vehicle of all financial transaction, ^{either} in connection ^{with} the experiments preparatory to the large scale experiment and ^{also} in connection ^{may} with the large scale experiment. Funds either governmental or private ~~could~~ be paid direct to university laboratories whenever expedient and similarly material could be purchased direct by government departments and be put at the disposal of universities wherever this seems consistent with the requirements of secrecy. It seems, however, advisable from the point of view of secrecy to have this council enter on its own in certain financial negotiations and business commitments and ~~even~~ more so in such preliminary negotiations as obtaining bids for quantities such as 20 tons ~~of~~ of uranium metal in order to avoid premature disclosure of too much governmental interest in connection with the present uranium work. * It appears also preferable to make those who collaborate in this work at various universities be made directly responsible to this council rather than have contract arrangements with the service ~~xxxx~~ departments or ^{loose} ~~lose~~ arrangements with various universities. The scientific workers who ^{agree to} collaborate ought to be encouraged to take out patents which would be assigned to the council which ^{then} will make license agreements with the

service departments free of charge. Unless this is done commercial firms might take the ~~out~~ patents and the service departments may have to pay higher royalties to such commercial firms.

One of the most urgent tasks of the council would be to explore the situation arising out of the danger that the uranium supplies of the United States from the Belgian Congo might be cut off by the international development. This makes it necessary to contact the Union Miniere and to find out whether it is technically possible to mine say, within six months or a year, a considerable fraction of the uranium deposit and whether ^{they would be} ~~it will be possible~~ ^{possible to let} the United States Government ~~to~~ acquire certain rights with respect to such ore without actually buying the ore. A quantity of this ore might for instance, be transported into this country with the aid of the United States Government and the Belgian company might retain for the present a title to this ore provided it commits itself not to re-export it without permission of the Government. This and the related questions have to be studied at once if the Government wants to be able to act without delay as soon as the large scale experiment has proved to be successful. The preparation of the large scale experiment itself requires negotiations which have to be carried out ^{concurrently with} ~~during~~ the first preparatory stage of the experimentation which is envisaged by Doctors Fermi and Szilard to require 6 to 8 months.

The council ought to be assisted by a scientific advisory committee to supervise and coordinate the work which is assisted by the council and also to attempt to coordinate all work which is carried out at ~~various~~ various universities. It is proposed that this committee comprises the following names: Dr. Fermi and Dr. Szilard have expressed their willingness to have their work supervised by this committee. It is further proposed that all funds received by the council for purposes of financing experiments be earmarked either for chain reactions on unseparated uranium or for separated

uranium. It is further proposed that Dr. Fermi and Dr. Szilard act as secretaries to the council in connection with all work concerning unseparated uranium and that Dr. Urey and Dr. Beams be asked to act as secretaries of the council in connection with all work concerning the separation of uranium ~~is~~ isotopes. It is further proposed that 25% of all funds which are without further specification be earmarked for unseparated uranium by setting aside for work on the fast neutron reaction as distinct from the slow neutron reaction which forms a basis of the proposed large scale experiment.

Aches

Dear Mr. President:

In furtherance of your kind letter to me of April 5, and the supplementary action on the same date taken at your behest by your secretary, General Watson, a conference was arranged by Dr. Briggs between the governmental group augmented by Admiral Bowen and members of the Special Advisory Committee together with the scientists at work on this problem. In view of your gracious expression of a desire to be advised of developments, I have the honor to report as follows:

After reviewing the progress on the experimental side since the initial meeting of October 21, 1939, the governmental group considered the proposal embodied in Dr. Einstein's letter of April 25, following a discussion that I had with him at Princeton that day, of which I enclose a copy for your kind perusal. Before taking action on the broad project that was submitted, the governmental group desired to await the results of an experiment then in progress. I am therefore happy to convey to you that the experiment has since been concluded with satisfactory results, as attested in the enclosed copy of a joint statement by the scientists concerned, transmitted simultaneously to Dr. Briggs and myself.

In view of this crucial development taken in conjunction with the international situation created by the invasion of Belgium, whose colony in the Congo is the most important source of uranium, may I take the liberty of reiterating the views embodied in the enclosed letter of Dr. Einstein: that no time should be lost in taking definitive action, not only as to the support to be accorded by the governmental ~~group~~ committee to the next and larger stage of the experiments, but to devising the organizational framework under which the enlargement of scope and acceleration of tempo of the experiment can be effectuated flexibly and expeditiously. In connection with the organizational side through a

Locks

-2-

non-profit corporation or board of trustees that would serve as an intermediary between the governmental group and the scientific institutions and the scientists engaged in the work, it might be helpful if one of your legal aides were brought into the circle of discussion along with General Watson serving as a ~~liaison~~ liaison for the representatives of the Service Department and the Bureau of Standards. As the academic year will shortly close and so lead to a dispersal of such scientific assistants as need to be organized in order to serve the next half year for the prosecution of the experiments fraught with such far-reaching significance for national defense, I should greatly appreciate conferring with you in the ~~course~~ course of next week at your convenience, and will hold myself in readiness to come forth with.

Dear Mr. President:

In furtherance of your kind letter to me of April 5, in which you suggested that a conference be held, such a conference was arranged by Dr. Briggs for April 27. The materials submitted to this conference, supplemented by the information which I understand will be conveyed through Columbia University to Dr. Briggs early next week, ought to make it possible for the committee which you have appointed to express ^(should) an opinion as to whether or not governmental action appears to be justified.

In view of ^{your} ~~the~~ gracious expression of a desire to be advised of developments, and assuming that the governmental committee ^(would upon your request) ~~will~~ report to you in favor of governmental action, I wish to set forth the following:

Through the invasion of Belgium the danger that America may be cut off from the uranium supplies of Belgian Congo has increased, and in my view no time should be lost in taking definitive action not only as to the support to be accorded by the government for the furtherance of the work on uranium, but also in devising a organizational framework under which the work can be carried out expeditiously and ~~at~~ with the required flexibility. This ^{La Har} aspect of the question has been particularly emphasized by Prof. Einstein, and I ~~likewise~~ take the liberty of enclosing a copy of his letter on this subject, ~~which he addressed to Dr. Briggs,~~ for your kind perusal. ^{necessary for} ~~The creation of a board of trustees that would serve as an intermediary between the governmental group and the scientists engaged in this work, and in particular the question of making available governmental funds to some such organization as~~ ^(non profit org) ~~will~~ have to be set up might make it desirable to bring one of your legal aides into the circle of discussion, along with General Watson, serving as a liaison for the representatives of the Service Departments and the Bureau of Standards.

Dear Dr. Briggs:

I understand that the experiment conducted on graphite at Columbia University has now been concluded and that you will be advised on Monday of the result by Dr. Pegram. It seems to me therefore that the governmental committee ought now to be in the position of ^{to} definitely advising the President as to whether or not governmental action in this matter appears to be justified. Assuming that the recommendation of the committee will be favorable towards such action, and in view of the increased urgency of action, arising out of the invasion of Belgium, I ^{have been} ^{to} taking up the ^{whole} question with the President. I am in particular anxious to discuss with the President the legal aspects of the case, i.e. in what form governmental funds can be made ~~available~~ available to such forms of organization as were discussed in the letter written to you by Prof. Einstein, which you communicated to us at the meeting of April 27.

I am, of course, anxious that, when I see the President, your committee should already be in the position of expressing an opinion, if asked to do so by the President. May I, in this connection, ask whether the letter written by Dr. Szilard on _____ contains sufficient data to enable Admiral Bown to form an opinion on the national aspect of the case? If additional information should be required I would suggest that you send me a telegram so that I might ask Dr. Szilard to see Admiral Bowen and give such additional information as might be required.

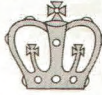
- 1.) E. Lakes
Pres
use for Navy
- 2.) Provenal Skubus
- 3.) Short coming
- 4.) Hisking

Geological map

Belgium

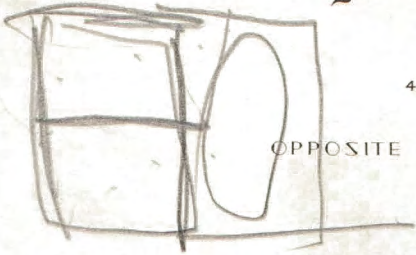
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King's Crown Hotel



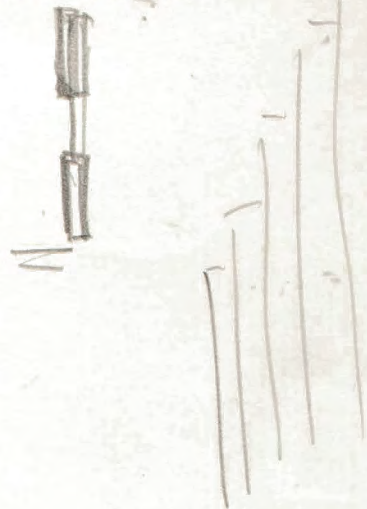
420 WEST 116TH STREET
NEW YORK

OPPOSITE COLUMBIA UNIVERSITY



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$$K = \frac{3v^2}{2} / RT$$



~~Handwritten scribbles~~

$$K = \frac{dv}{v} \frac{3v^2}{2 \cdot 10^{10}}$$

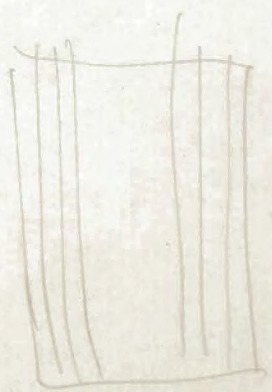
$$v = 2000 \text{ m} = 2 \cdot 10^4 \text{ cm/sec}$$

$$v^2 = 4 \times 10^8 \frac{\text{cm}^2}{\text{sec}^2}$$

$$K = \frac{dv}{v} \frac{3 \times 2 \times}{100}$$

$$\frac{dv}{v} = \frac{1}{10}$$

$$d = 1 \text{ cm}$$



Report on the
meeting ~~of~~

Our work is

to organize the work towards a large scale experiment on a wider basis.

The possibility of producing a chain reaction depends on a number of nuclear constants whose values are at present known quite ~~too imprecisely with error~~ ^{inadequately} for enabling to predict with any assurance what the outcome is going to be. ~~Nevertheless if one is allowed to take what at present seems to be the most probable values of these constants the result appears to be favorable. However the limits of possible error~~ ^{are not to be excluded} experimental error are so wide that a possibility of failure must be very seriously considered. However it is . . .