Cold Fusion Country History Project

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The 20th Anniversary of the Fleischmann-Pons announcement was approaching as we prepared for ICCF-14. An adjunct project was initiated to write histories of the research activities on a country-by-country basis, preferably one in the language of the country and then a translation into English. It had become clear that the normal historical record of the field's scientific development was in danger of being lost due to deaths, slow development of the field, and general absence of institutional records. Thus was born the "cold fusion" Country History Project. Our objective was to give each of the countries that have contributed significantly an opportunity to record their research efforts and results in a form both accessible to native speakers and to English speakers. Teams were assembled in China, France, India, Italy, Japan, Russia, United Kingdom and the United States. At ICCF-14, six status reports were presented, covering the history in China, France, India, Italy, Japan, and Russia. Selected text from these presentations is shown below. There was no presentation at ICCF-14 Wednesday morning session devoted to the Country Histories of the USA and UK history work.

It is our intention that these reports, when finished, will be brought together as a set and made widely available in English. An editorial board of scientists not involved in the field has been assembled to review the final manuscripts. The United Kingdom "book" will likely be an expansion of the history of the UK's Atomic Energy Research Establishment, Harwell. The USA history is directed at extracting and making available research work that has hitherto not been available, particularly in an organized form, from US government laboratories.

The science of nuclear physics and nuclear fission developed in the politically charged 1930s and moved to national importance with Roosevelt's receipt of Einstein's 2 August 1939 warning letter of the potential of nuclear energy. The Manhattan Project pushed into existence the atomic bomb and the foundations of nuclear power generation leaving behind the development of a basic scientific understanding of what is a very difficult many-body problem. The physical models we have used for about 70 years still retain much of the flavor of the

needs of an engineering project. Their scientific limitations are discussed by Norman Cook in his book, Models of Nuclear Physics, Springer 2006. Cook's book and presentation at ICCF-14 provide a useful context for gaining a deeper understanding the history of development of the Fleischmann-Pons Effect and why it was controversial. We hope that, when finished, this Country History project will offer a better appreciation of what will be required to deal with some of the most fundamental problems of the physical sciences.

1. "Condensed Matter Nuclear Science" Research in China

Presentation Title: Normal Temperature Nuclear Fusion
Xing Z. Li, Department of Physics, Tsinghua University, Beijing
Presentation at ICCF-14, Washington D.C., Aug.13 2008,

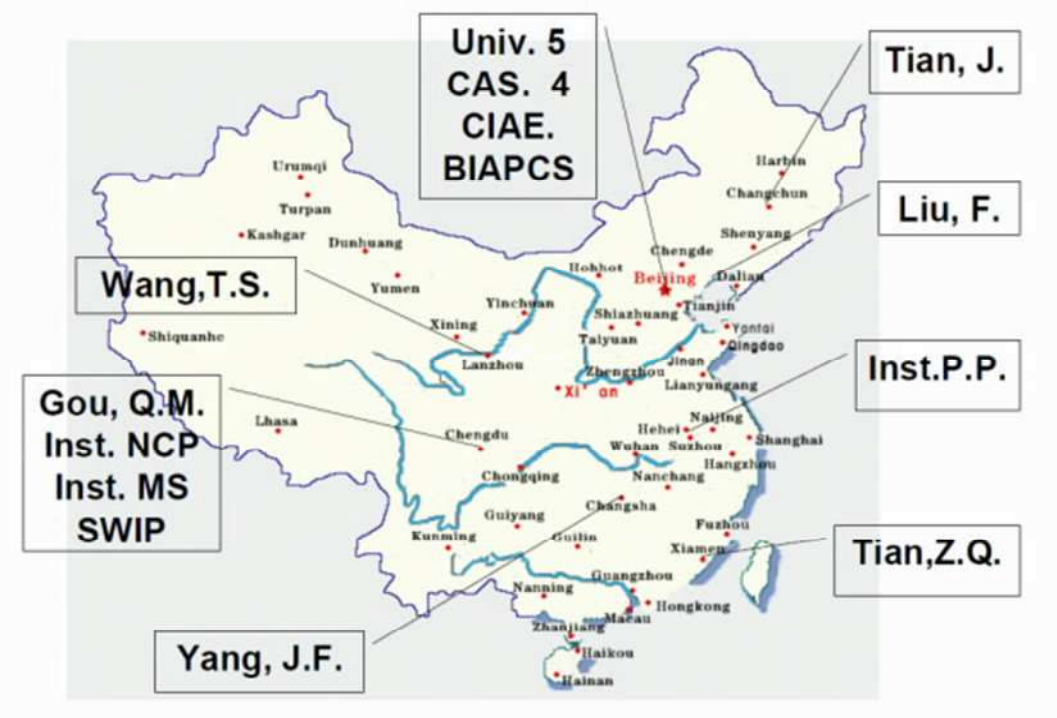
Abstract. Five features of "Condensed Matter Nuclear Science" research in China are addressed. Five important meetings are described from the beginning to April of 2008. Twenty institutions are listed with their principle investigators, research staffs, and main research subjects. Twenty-nine articles are cited for reference.

Nomenclature. Cold fusion is referred to as "normal temperature nuclear fusion" in China. It was given this name by Academician, Qian Xue Sen. In 2002, during ICCF-9, International Advisory Committee decided on a new name, Condensed Matter Nuclear Science (CMNS), in order to show the progress of the normal temperature nuclear fusion which had initiated this research field. This article mainly discusses the history; hence, it still adopts the name of normal temperature nuclear fusion (or in some cases "cold fusion").

Introduction. Normal temperature nuclear fusion has been conducted for 19 years in China. When reviewing it, five aspects of the research stand out:

1. National policy has always kept an expectation established at the beginning.
2. A group of top scientists have continued to support this research, even though it appears to violate common-sense.
3. International collaboration has been an important aspect from beginning until the present day.
4. Chinese researchers have attempted to develop the basic research independently with our own approaches.
5. Hot fusion institutions have kept abreast of development in normal temperature nuclear fusion, and have even given a hand occasionally.

Over 20 institutions have continued research into these phenomena since the 1989 FPE announcement. The map below provides an indication of the work as of August 2008.



2. “Condensed Matter Nuclear Science” Research in France

History of Cold Fusion France

Jean-Paul Biberian, Faculté des Sciences de Luminy, Marseille
Jacques Dufour, CNAM, Paris

The players. These scientists and engineers have entered the field at one time or another :

The CEA Grenoble (Georges Lonchampt).
CNAM (Jacques Dufour).
CNAM (Pierre Clauzon).
The EDF (Electricité de France).
Université Aix-Marseille (Jean-Paul Biberian).
IMRA Sophia Antipolis (Stan Pons and Martin Fleischman).
Independent researcher (Jean-Louis Naudin).
Independent researcher (Fabrice David).
Fondation Louis de Broglie (Georges Lochak and Henri Lehn).

The future. Unless something striking happens soon, the field will disappear in France. Today’s active researchers”

CNAM (Pierre Clauzon, already retired).
Université Aix-Marseille (Jean-Paul Biberian, will retire in three years).
Fondation Louis de Broglie(George Lochak and Henri Lehn, already retired).
Fabrice David.

Research interest among younger scientist can be found at CNAM where Jacques Dufour has a team of two young scientists actively testing a novel working hypothesis (picochemistry) that based on a current center of interest in main stream physics (long range weak Yukawa potential in the Standard Model Extension).

3. "Condensed Matter Nuclear Science" Research in India

History of Cold Fusion Research in India
M. Srinivasan, Formerly of Bhaba Atomic Research Centre, Trombay, Mumbai

Phases of CF Research in India

Phase i : 1989 to 1991 (ICCF 1) - Most productive era!
Phase ii : 1992 to 1995 (ICCF 3,4,5) - Post Iyengar period
Phase iii : 1996 to 2007 (12 years) India totally blanked out!
Phase iv : 2008 Revival - Following NIAS meeting of 9th January 2008

Overview of BARC (1989-90)

- BARC has > 50 Divisions & 3000 Scientists!
- 12 teams (~ 50 scientists) took up challenge
- To verify "nuclear origin" of phenomenon
- Looked for neutrons & Tritium
- First neutrons detected on 21st April 1989!
- Within a year all teams reported both n & T
- Among first groups to find branching ratio anomaly namely (n/T) = ~ 1E (-7)
- ICENES Karlsruhe 4th to 7th July 1989
- Report BARC 1500 (Aug '89) (Historical role!)
- ICCF 1 & Fusion Technology paper of Aug '90 with 50 authors summarize work of 89-90!

4. "Condensed Matter Nuclear Science" Research in Italy

Cold Fusion in Italy
Francesco Scaramuzzi , LNF/INFN, Frascati – Italy

Introduction. I will discuss a book produced by ENEA: "The history of Cold Fusion in Italy". I will touch the following issues:

- The book
- The beginning of the Italian History of CF
- The years of maximum effort
- The decay
- Comments

Comments.

- cold fusion is a reality
- it is prominently a scientific problem, very much interesting at that

need for a coordinated effort in material science
- it is important to convince the scientific world of the validity of the issue, through neat, reproducible experiments
- it is still too early to put the accent on the possible applicative fall-outs, even though everyone hopes in them, in particular in the field of energy production.

5. "Condensed Matter Nuclear Science" Research in Japan

Country History of Japanese Work on Cold Fusion - Toward further development of Condensed Matter Nuclear Science

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Y. Iwamura
Advanced Technology Research Center, MHI

Abstract. We briefly summarize the history of Japanese work on cold fusion after 1989. Since the excellent work performed by Prof. Arata are introduced and discussed in the special session, we try to summarize other works in Japan. The history can be divided into three periods: the 1st period is from the announcement by Fleischmann and Pons to the ICCF3 Nagoya Conference (1989 - 1993); the 2nd period is during the New Hydrogen Energy (NHE) Project (1994 – 1998); and the 3rd after the NHE project (1999 – present). Characteristics of each period and the present situation are presented.

Introduction. In the 19 years following the announcement of Professors Martin Fleischmann and Stanley Pons, much work on the cold fusion has been carried out in Japan as well as in other countries. The organizers of this conference have asked us to edit a document on "cold fusion" research in Japan. Many official reports for various projects, proceedings of domestic meetings on cold fusion and research papers describe the progress of this research in Japan. Thus, we thought that it is worthwhile to collect and summarize such records as an interim report in the cold fusion research. Since the excellent works performed by Prof. Arata were introduced and fully discussed in the special session of ICCF14, we have tried to summarize other work based on many official reports in Japan.
The history of cold fusion research in Japan can be divided into three periods: the 1st period is from the announcement of F-P to the ICCF3 Nagoya Conference (1989 - 1993), the 2nd period is during the New Hydrogen Energy (NHE) Project (1994 – 1998), and the 3rd after the NHE project (1999 – present), as schematically shown in Fig. 1. We will show background and characteristics of each period, as well as notable research.

6. "Condensed Matter Nuclear Science" Research in Russia (Former Soviet Union)

Status of Russian Research on Low Energy Nuclear Reactions in Non-Equilibrium Condensed Matter, Based on Publications in Peer-Reviewed Journals

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Why peer-reviewed journals only in this history? LENR (CMNS) is a new science and still shows poor reproducibility. In some sense it is a "Proto-science" (the definition of L. Kowalski). In some cases poor experimental equipment, reflecting a lack of support, and overselling of results, while seeking support, leads to a lack of credibility. Lacking independent confirmations one may not believe in each result! It is hard to distinguish the grains of truth from the stream of informational noise. Because peer reviewed journals take on the responsibility for the integrity of their publications they use respected scientists in the field of journal, although also this introduces biases. Thus, we have chosen only per-reviewed papers that have been filtered by editors and published.

Wide Survey of FSU/Russian CMNS Related Activities. CMNS Russian activity, based on local conference and seminar proceedings has been prepared by Yuri Bazhutov and will be described in the so-labeled section below.

What we are studying. Under LENR or CMNS we study specific nuclear processes at very low kinetic energy of projectile nuclei (say, $kT < E_{lab} < 1$ KeV) that originate and are enhanced by strictly non-equilibrium condensed matter/crystalline lattice environment. These peculiarities make LENR (and nuclear cross-sections) drastically distinctive from the nuclear reactions taking place in vacuum/plasma collision. Broadly, the LENR/CMNS effects include nuclear, calorimetric, electrochemical, condensed matter physics, material science and other accompanying aspects. This field is inherently an interdisciplinary research area.

Some dates and statistics. After the discovery of deuterium's role in Pd cathodes during electrolysis (by Fleischmann and Ponce in 1989) many groups in the former USSR started their works on LENR. In April 1989 to support this research at the national government level a special Council on Cold Fusion was been created in the USSR Academy of Sciences, headed by a vice-president of Academy Academician V. Nefedov.
The First All-Union Conference on Cold Fusion at JINR-Dubna was in March 1991. Fourteen local Russian conferences and a monthly Cold Fusion seminar at PF University, Moscow (N. Samsonenko) were organized. More than 250 Russian papers have appeared in peer-reviewed journals since1989. Since 1993 there has been no central government funding of research in this area. FSU scientist suffer from the Bill Collis Vicious Cycle: "insufficient funding leads to poor research, poor research leads to poor papers, poor papers lead to insufficient funding".

Critical Russian Contributions in LENR/CMNS Research - Prior to 1989 F-P announcement.
First experimental study and development of the microscopic acceleration model: *Fractofusion on fracture of deuterated dielectrics: LiD and heavy ice crystals (Klyuev VA, Lipson AG et al., Sov. Tech. Phys. Lett 12, 551 (1986), Deryaguin BV, Klyuev VA, Lipson AG, Toporov YuP,*

Colloid J. USSR 48, 8(1986)). In 1989 TiDx fracture neutrons: [B.V. Deryaguin et al, Nature, 341, 492, (1989)].
Theoretical considerations re the effects on the Coulomb barrier that is reduced in deuterated crystals, depending on crystallographic direction, resulting in excess energy production using deuteron beam and crystalline target: *V.V. Vysotsky and R.N. Kuzmin, Sov.Tech. Phys. Lett., 7, 981 (1983)*

1986 Neutron emission experiment on LiD fracture (Klyuev VA, Lipson AG, Deryaguin BV et al., Sov. Tech. Phys. Lett **12**, 551 (1986))-**Confirmed**: Kaushik TC, Kulkarni LV, Shyam A, Srinivasan M, Physics Lett. A **232** (1997) 384; *Shyam A* et al, Indian J. Pure and Appl. Phys., vol: 36(2), 56 (2008).

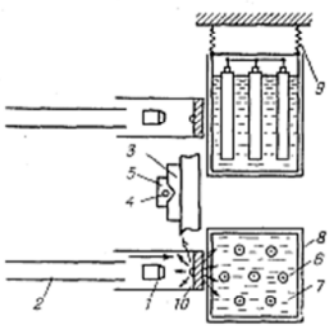

Рис. 16. Схема экспериментальной установки [9]

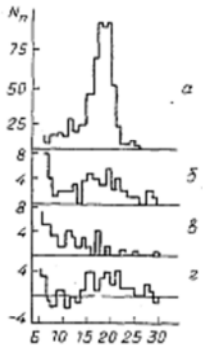

Рис. 17. Гистограмма распределения импульсов по каналам анализатора от источника нейтронов (*а*), при разрушении мишеней из дейтерида лития (*б*), при стрельбе по мишеням, не содержащим кристаллов LiD, «импульсный фон» (*в*) и результат вычитания «импульсного» и космического фонов из амплитудного спектра снятого при разрушении мишеней из LiD (*г*)

ICCF-14, Washington DC, 10-15
August, 2008

Summary of FSU/Russian Contributions. Russian research in LENR has made a critical, important contribution. The significant areas include, but are not limited by fracto-fusion, nuclear emissions during acoustic cavitation, glow discharge effects (isotopic shifts and soft X-ray emission first observed by Karabut et al), energetic alpha particle emissions, and the first application of CR-39 and so on. These contributions are pioneering results and have affected international development of CMNS. Despite the clear evidence and high value of Russian achievements, much of Russian researcher work has been ignored and have not been cited (in time) in international publications on LENR and other related fields. Particular examples – fractofusion, cavitation fusion, neutrons emitted from ferroelectrics and so on. It is worth noting that main stream Soviet/Russian physics journals (JETP, JETP Lett., Tech. Phys. Tech.

Phys, Lett.) have been translated to English (almost simultaneously with the Russian version) by American Institute of Physics. So the failure to make reference to this literature cannot be attributed being only available in Russian.

Conclusion. The research product of Russian groups answer affirmatively that the question existence of LENR. Numerous peer reviewed and published Russian papers on CMNS in non-equilibrium condensed matter repeatedly show the occurrence of LENR in the form of excess heat and/or nuclear emissions. The main problems of Russian LENR studies is a total lack of institutional funding resulting in fragmentation of the research conducted and the low circulation and readership of the results in international community. Much has been done so it is clear that concentration of Russian efforts and international cooperation are highly productive. The result of concentrated efforts and international collaboration finally put in place a complete CMNS experiments where simultaneous detection of excess heat, atomic ^{4}He, ^{3}T, charged particles (DD-products +energetic alphas), neutron emission is accomplished.

7. Role of Russian Scientists in Cold Nuclear Transmutation – Condensed Matter Nuclear Science (According to Conferences Proceedings, 1991-2007)

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Abstract. The following presents a statistical analysis of Russian scientists' personal research (together with Ukrainian scientists) according to their publications in different Cold Fusion Conferences Proceedings. Among these conferences are following: 11 International Conferences on Cold Fusion (3-13 ICCF, 1992-2007); Soviet Union Conference on Cold Nuclear Fusion (JINR-MSU, 1991); Soviet Union Seminar on Chemistry & Technology of Hydrogen (Zarechnyi, 1991); 2-d International Symposium on Cold Fusion (Minsk, 1994); all 14 Russian Conferences on Cold Nuclear Transmutation (Abrau-Dyurso, Sochi, Dagomys, 1993-2006). An analysis is presented of the total number of Russian scientists publications in International Conferences on Cold Fusion compared to publications from other countries. This analysis has demonstrated the considerable contribution of Russian Scientific Community to the World Cold Fusion researches.

Introduction. Immediately after M. Fleishmann and S. Pons's press conference on 23 March 1989 and in the scientific press [1,2] about discovery of the new phenomenon named by them as Cold Nuclear Fusion the Russian scientists have actively joined in its research. Moreover, some researches have been lead even earlier [3,4,5], but they were not considered by authors, as essentially new direction in a science (mechanoemission by Deryagin B.V. – see references in the first part of this Russian/FSU history above), or simply were not published in scientific journals since they were seen as contradicting orthodox theoretical representations (Yaroslavskiy M.A). Therefore already at the First (and last) Soviet Union Conference on Cold Fusion (SUC CF) there were presented almost a hundred reports from nearby fifty various scientific groups. It was the first large congress of Russian (and also Ukrainian and Belarus)

scientists on the problem of Cold Fusion which took place in the 2nd anniversary of announcement of this phenomenon (22-23 March, 1991) in the Joint Institute of Nuclear Researches in Dubna and also has come to the end in the Moscow State University. Unfortunately, all papers of this meeting have not been published, only Abstracts SUC CF [6] has been published.

Synopsis of Some Aspects of Russian Meetings. The very first RCCNT (more exact then it still referred to RCCNF) took place in September 1993 in Abrau-Dyurso near Novorossiysk on the basis of sport camp of the Rostov State University. It became long-awaited heiress to All-Union Conference on Cold Nuclear Fusion (1991). On it outstanding representatives CNT from abroad have been presented more than 30 Russian and Ukrainian scientists. At the second RCCNT (RCCFNT-2) that took place on September, 19-23rd at the rest house of the Moscow State University in Sochi, 39 scientists from Russia, Ukraine and Belarus and also from the far abroad. All the subsequent RCCNT (3-14, 1995-2006) were held at the resort "Olympic-Dagomys" (Sochi). At each were present about 30 Russian (and also Ukrainian, Kazakh and Belarus) scientists with their reports and some from a few scientists of the far abroad.

Views of the status of Russian Research and Organiation. The main "Gold" stock of high scientific physical and chemical potential in researches of Cold Fusion in Russia is its highly professional researchers managing in the hardest conditions of full disorder of a science in the country to spend solid theoretical and experimental researches, recognized by all international community as priority. From our statistics it is apparent, that many Russian scientists, not having a financial opportunity to attend ICCF, actively enough work and are published in RCCNT Proceedings. Such professional activity of the Russian scientists allows hoping, eventually, will find recognition and support and will allow the Russian science to bring still the defining contribution to World scientific and technical progress.

Activity of the Russian scientific community on a problem Cold Nuclear Transmutation is coordinated by its Interdepartmental Coordination Committee (ICC), created at vice-president of the Russian Academy of Sciences, academician Nefyodov O.M. in 1995. Its chairmen in different years were academicians Kolotyrkin Ya.M., Baraboshkin A.N. and Kazarinov V.E. In 2004 in connection with reorganization of Presidium of the Russian Academy of Science, ICC also has been reorganized in the structure and has been registered at the Russian Physical Society by its president, Professor Mikhailin V.V. The academician of the Russian Academy of Nature Sciences Rukhadze A.A. is now the new ICC CNT Chairman.