19th Summer School and International
Symposium on the Physics of Ionized Gases

19th SPIG

August 31 - September 4, 1998, Zlatibor, Yugoslavia

CONTRIBUTED PAPERS

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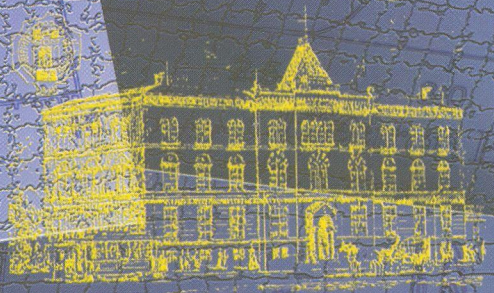
ABSTRACTS OF INVITED LECTURES,
TOPICAL INVITED LECTURES AND PROGRESS REPORTS



Editors:
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PREFACE

This book contains the Contributed papers and abstracts of the Invited lectures, Topical invited lectures and Progress reports to be presented at the 19th Summer School and International Symposium on the Physics of Ionized Gases - SPIG '98. The Symposium will be held in Zlatibor, Yugoslavia, from August 31 to September 4, 1998.

In accordance with the scientific scope of the Symposium, the Contributed papers are related to the following research fields: Atomic Collision Processes, Particle and Laser Beam Interaction with Solids, Low Temperature Plasmas and General Plasmas. The length of a Contributed paper is limited to a maximum of four pages, each of them presenting an original work with sufficient amount of scientific information.

The Scientific and Organizing Committees believe that this Symposium, with its Invited talks and Contributed papers, managed to maintain the high scientific level established by preceding SPIG conferences in the 38 years long tradition.

The Editors are indebted to the members of the Scientific Committee for their efforts in formulation of the program, especially in proposing the speakers and in the selection of papers included in this book.

The Organizer of the 19th SPIG is the Faculty of Physics, University of Belgrade. The Organizing Committee is grateful to the staff of the Faculty for their help in preparation of this Symposium. The Organizer gratefully acknowledges the support of the Ministry of Science and Technology of the Republic of Serbia and Ministry of the Development, Science and Environment of the Federal Republic of Yugoslavia.

Special gratitude is due to N. Šišović and M. Savić whose enthusiastic assistance and hard work made this book available.

The participants have been asked to send their papers camera ready, so no typing, spelling and grammatical errors have been corrected in the course of preparation of this book.

July, 1998

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LOGICAL MODEL OF INFORMATION SYSTEM IN ATOMIC COLLISION PHYSICS

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The organization of any research assumes an insight into very large and not easy accessible literature about the matters already completed, which could have connecting points with an anticipated research. This problem is to be solved in such a way that each researcher follows researches carried out in his scientific area through the various forms of their publishing. The information gathered during such "search" are mostly numerical, being presented and scattered in the text or in the form of the tables inserted in the text, which means that requested data are to be obtained by "searching through the free text". In addition, in spite of a good and solid following of such events, it may happen that during a certain time period the relevant information accumulate in such extent that it is not possible to process them in a high-quality way if traditional methods are used. In case of researches performed by the method of synthesis of the results obtained by the other researchers, the difficulties increase disproportionately, because the data are distributed in publications differentiating not only by the process type but also by the methodology.

However, previous attempts in order to solve this problem (Gaphyor, ISIS, ...) did not give a satisfactory results. In spite of large bibliography, defragmentation of the texts is made to relatively small number of categories, so that the access to data is brought down to the searching by the key words, i.e. mostly by the free text, thus slowing down the work and making impossible the selective access to data. The selection of data is to be carried out only on the basis of previously defined queries, which should not be changed by the user (researcher). The selected data can not be decomposed and connected with data from other areas according to the wishes or needs of the researcher.

This paper presents the results of making the logical model of information system applied in the atomic collision physics. Figure 1 shows the data flow diagram (DFD) of the decomposed research function, presenting a proper approach to the solution of this problem. In order to make a planned research based on the set aim, the researchers make an insight into

accessible data about other researches and define the initial condition of the research in question. The research results are published and filed in some of bibliographic forms and the data about the all-relevant aspects of research are stored in database (dB).

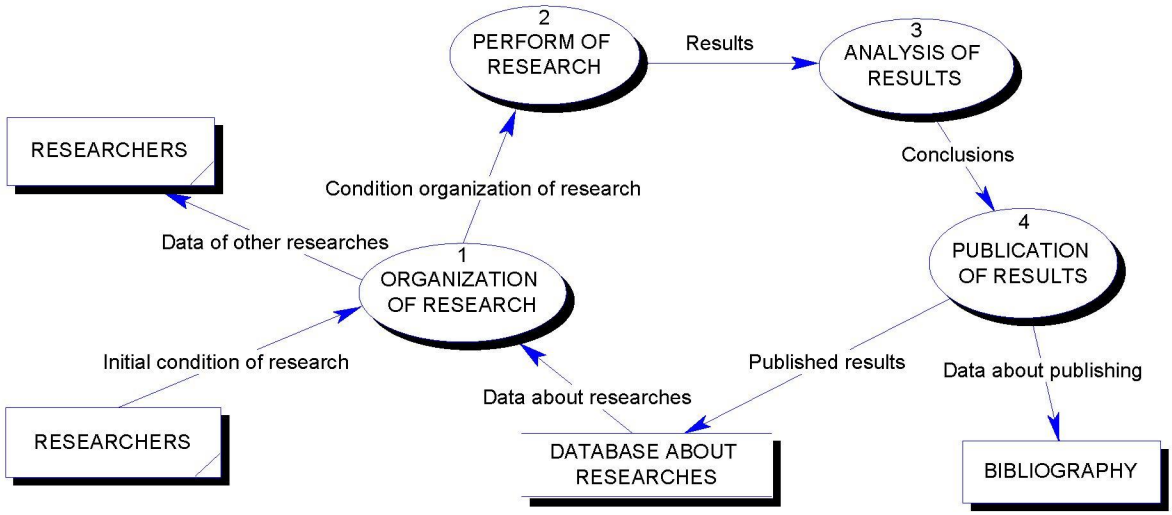

Figure 1. DFD of decomposed research function

DFD defined in such a way shows the global data flow between the main functions, environment entity and data storage. Based on this DFD, an information model (logic model of process and logic model of data) may be defined as an informative support to the research function within the various scientific areas.

Researches in the area of an atomic collision physics are performed by the experiments, where the collisions of selected particles are made, when during such interactions the particles are playing the roles of "target" and "missile". Each type of particle may play first and/or second role. During organization of an experiment, the target and missile are to be prepared in a convenient way, so that they are in a certain states. As far as the interaction participants are concerned, it is important for an experiment to know which particles played the roles of target and missile, what is the way of their preparation and how their states look like. Within the part of relationship data model which defines these facts, it would be as it is in Figure 2, noting that in this diagram the symbols correspond to the standards of Integration Definition for Information Modeling (IDEF1X) for developing a logic model of data.

This part of relationship data model enables the researcher to search the data and information of all experiments being filed in database and to make corresponding conclusions. It may be realized by defining an inquiry about the relevant facts on particles that took part in experiments as a target and/or missile, on the ways of their preparation and on the parametric states of such particles.

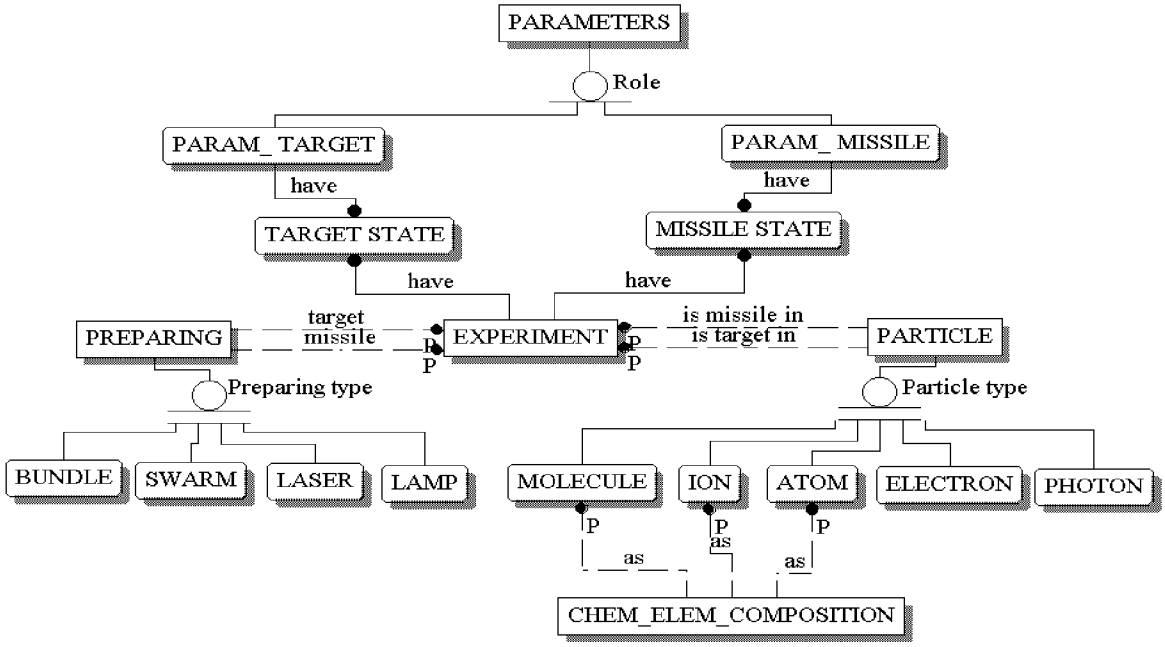

Figure 2. A part of a relationship data model about the particles participating in the experiments and the ways of their preparation.

In order to complete the organization of the research, it is necessary to define a several initial conditions in which it is to be performed which is defined by the relationship data model as Figure 3.

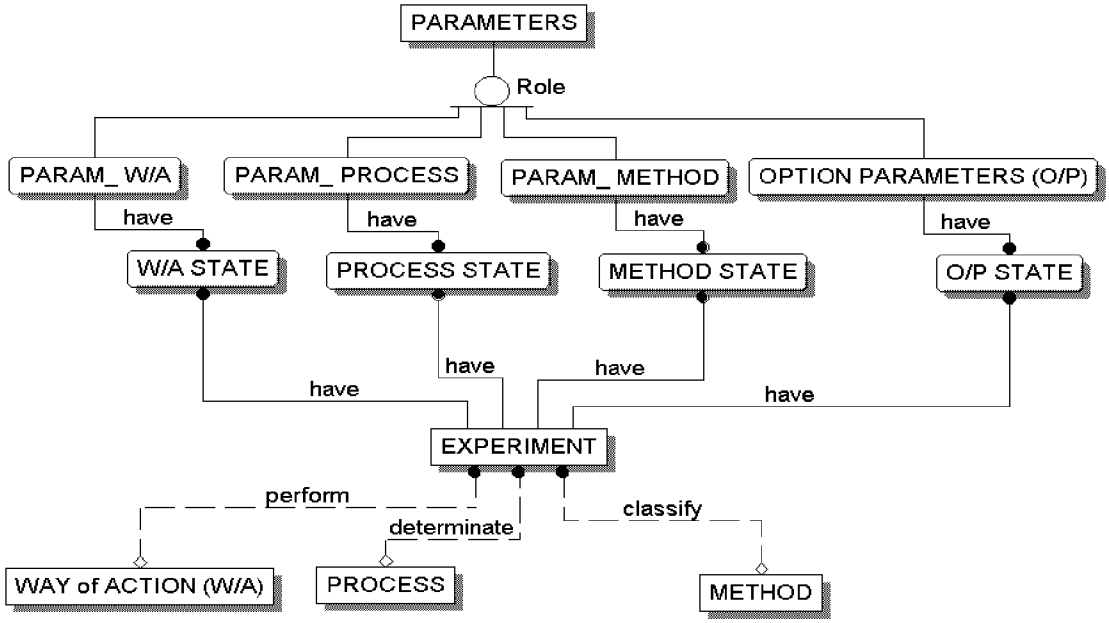

Figure 3. A part of a relationship data model about the ways of actions, processes and methods used in experiments.

As it is obvious, it is necessary to define which way of action is to be applied to make an experiment, which process is applied and which method is used. As far as parameters are concerned, being used for more precise definition of each experiment, they may be intended

for a specific purpose or optional. The first type of parameters precisely relates to the description of the way of action, process and method. Which one of the fixed parameters will appear is to be defined from one case to another, i. l. from one experiment to another. The optional parameters are used for additional definition of some experiment characteristics.

An experiment is to be carried out after completion of its organization. The realization of this function produces the research results. Depending on which method of research is used (experimental, theoretic, method of synthesis or modeling) appropriate results are obtained, which is defined by the relationship data model as Figure 4. They may be shown in different multimedia forms and ways of storage. It is assumed here, not only storage of the obtained results, but the searching of the stored results obtained by the other researchers with a certain purpose.

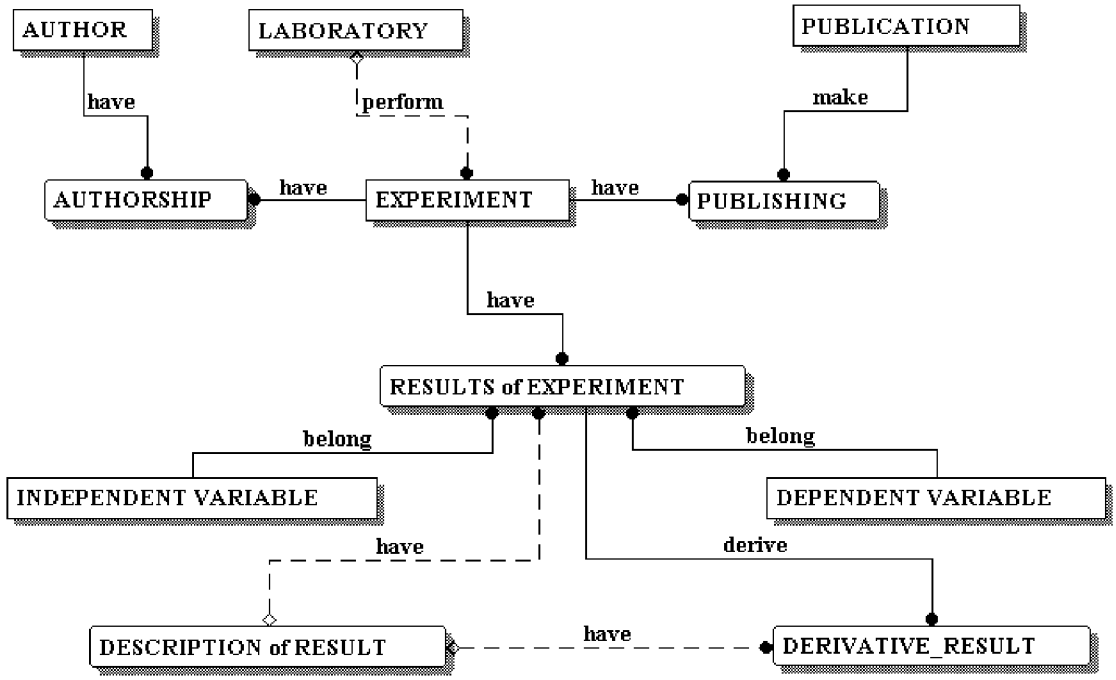

Figure 4. A part of a relationship data model about the results, authors and publications.

The obtained results are analyzed and appropriate conclusions are drawn. The research results are to be published and stored in database after verification. Data about authors and their participation in researches, data about publications where the research results are presented, as well as data about laboratories in which the researches are performed, are also to be stored in data base. All this is enabled by a part of a relationship data model shown in Figure 4. Sub-schemes in Figure 2, 3 and 4 are forming the whole relationship data model of an information system as a support to the researches in atomic physics.