

The External Evaluation Report of a Doctoral Study Domain

DOCTORAL FIELD OF PHYSICS IOSUD – UNIVERSITY OF CRAIOVA DOCTORAL SCHOOL OF SCIENCES

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I. Introduction¹

This external evaluation report is concerned with the maintenance of Accreditation of the Doctoral Field of Physics from IOSUD – UNIVERSITY OF CRAIOVA DOCTORAL SCHOOL OF SCIENCES as part of the Periodical External Evaluation of the Institution Organising Doctoral Study Programs (IOSUD), and of the doctoral study domains.

The evaluation period comprised 5 days, from 5 to 9.07.2021 and was made virtually by zoom.

The experts Committee of the Doctoral study domains “Mathematics and natural sciences - fundamental domain of science” 21 Physics C1 was:

- ***Coordinator Prof.Dr Daniela DRAGOMAN Universitatea Bucuresti***
- ***International expert Dr. Diego Pablo Ruiz-Padillo Univ. Granada, Spain***
- ***PhD student Constantin Munteanu Universitatea Tehnică „Gheorghe Asachi” din Iași***

The self-evaluation of IOSUD - University of Craiova was carried out in order to maintain the accreditation of doctoral schools and doctoral fields of study and was based on the provisions and recommendations of the following normative acts:

¹ Each time when applicable the information shall be presented gender-wise.



- Order of the Minister of National Education no. 3200 of February 7, 2020, published in the Official Journal of Romania, Part I, no. 132 of February 19, 2020;
- Order of the Minister of National Education no. 3651 of April 12, 2021, published in the Official Journal, part I, No. 441 / 20.04.2021, regarding the approval of the Methodology for the evaluation of doctoral studies and of the systems of criteria, standards and performance indicators used in the evaluation
- The external evaluation guide drafted by the Romanian Agency for Quality Assurance in Higher Education (ARACIS).

Previously the University of Craiova was awarded the "High confidence degree" in 2015. Anexa2_IOSUD ARACIS Certificate_2015 following the external evaluation by the Romanian Agency for Quality Assurance in Higher Education,

The Doctoral School of Sciences was established within the University of Craiova by regrouping the doctoral fields of Chemistry, Physics, Informatics and Mathematics in a single doctoral school, in accordance with the stipulations of the National Education Law no. 1/2011 and as an effect of Government Decision no. 681/2011 regarding the Code of doctoral studies. The Doctoral School of Sciences counts 22 doctoral supervisors. In the Doctoral School of Physics there are 7 Doctoral supervisors:

- o Professor Bizdadea Constantin, PhD - Theoretical Physics
- o Professor Cioroianu Eugen-Mihăiță, PhD - Theoretical physics
- o Professor Constantinescu Radu, PhD - Theoretical Physics
- o Research scientist gr. I Dr. Dinescu Maria, PhD - Physics of materials
- o Professor Rotaru Petre, PhD - Experimental physics
- o Professor Saliu Solange-Odile, PhD - Theoretical Physics
- o Astronomer Văduvescu Ovidiu – Astrophysics

The 7 PhD Supervisors from the Doctoral School of Physics from the University of Craiova advise PhD students in the following fields:

- In Mathematical and Theoretical Physics: C.Bizdadea, E.Cioroianu, R.Constantinescu and O.Saliu;
- In Applied Physics: M.Dinescu and P.Rotaru.
- In Astronomy and Astrophysics: O.Vaduvescu.

In the Doctoral field of Physics at IOSUD University of Craiova, there is a total of 6 Doctoral students in the field of doctoral studies in Physics. They are assigned to 4 of the Doctoral supervisors.

In the period 2015 - 2020, a number of 10 subsidised places were allocated for admission to the Doctoral School, specialisation - Physics, on an average, 2 places per academic year. In order to fill the 10 places, a total number of 14 candidates registered for admission. As a result of the selection made by the examination board, 10 candidates obtained state-budgeted places, and the other 4 opted for tuition fee-based places.



Out of the 14 Doctoral students enrolled in the period 2015-2020, 5 Doctoral students graduated from UCV Master's programmes, and the other 9 Doctoral students completed the previous cycle at another university. /

According to the statements in Annex B.1.1.1, in the period 2015 - 2020 a total number of 9 Doctoral students in the field of Physics publicly defended their Doctoral theses; 5 Doctoral students enrolled before October 1st 2015, and 4 Doctoral students enrolled after this date list of papers published by each of the 9 Doctoral students who publicly defended the theses in the period 2015-2020, and copies of 1-2 representative papers for each of them are presented in Annex Extracts. The list includes 29 papers published in ISI-rated journals (on average 3.2 ISI papers / thesis) and about 20 papers presented at conferences and published in indexed journals or proceedings. (2.2 papers / thesis).

Recently, specific standards to be fulfilled have been established by the Council of the Doctoral School of Sciences quite recently and they imposes that, for all the 4 domains, the thesis have to be based on minimum 2 scientific papers published in ISI journals.

II. Methods used

The methods and tools used in the external evaluation process, before and during the evaluation visit were the following ones:

- The analysis of the internal evaluation report of the doctoral study domain under review and its Annexes;***
- The analysis of documents or information made available by the IOSUD, in physical format, during the evaluation visit. Some information and were requested and are available in the annexes.***
- The analysis of documents, data and information available on the IOSUD/Doctoral School(s) website, in electronic format;***
- Meeting/discussions with doctoral students in the doctoral study domain under review;***
- Meeting/Discussions with the graduates of the doctoral study domain under review;***
- Meeting/Discussions with employers of the graduates in the doctoral study domain under review;***
- Meeting/Discussions with the school officials of the Doctoral School(s) in which the doctoral study domain under review is operating;***
- Meeting/Discussions with the doctoral advisors in the doctoral study domain under review;***
- Meeting/discussions with the representatives of the various structures of the IOSUD/Doctoral School(s) in which the doctoral study domain under review is operating:***
- The Council of the Doctoral School, the Board of Directors, the Quality Assessment and Assurance Commission, the Quality Assurance Department, the Ethics Commission;***

The timetable of the institutional evaluation visit - IOSUD / doctoral study domains at the University of Craiova reflects the different agents who attended the meetings in the evaluation visit period.



III. Analysis of ARACIS's performance indicators

Domain A. INSTITUTIONAL CAPACITY

**general description of domain analysis.*

Criterion A.1. The administrative, managerial institutional structures and the financial resources

**general description of the criterion analysis.*

Standard A.1.1. The institution organizing doctoral studies (IOSUD) has implemented the effective functioning mechanisms provided for in the specific legislation on the organization of doctoral studies.

**general description of the standard analysis.*

Performance Indicator A.1.1.1. *The existence of specific regulations and their application at the level of the Doctoral School of the respective university doctoral study domain:*

The Doctoral field of Physics carries out its activity within the Doctoral School of Sciences. This doctoral school proves the existence of specific regulations and their application at the level of the Doctoral School of the respective university doctoral study domain:

(a) the internal regulations of the Doctoral School are provided at University of Craiova (IOSUD-UCV) (Annex A.1.1.1.a).

(b) The methodology for conducting the elections for the position of CSD director, as well as the appointment by the students of the representative in the CSD is given in Evidence Annex A.1.1.1.b of the Self-evaluation Report.

c) the Methodologies for organizing and conducting doctoral studies is provided in Annex A.1.1.1.c.

d) the existence of mechanisms for recognizing the status of a Doctoral advisor and the equivalence of the doctoral degree obtained abroad. IOSUD University of Craiova includes mechanisms for recognizing the quality of Doctoral supervisor and for the equivalence of the PhD title conferred in other countries (Regulation of the Doctoral School of Sciences, Art.4(2))

e) The Doctoral School of Sciences has two functional management structures;

The Council of Doctoral University Studies of IOSUD

The Council of the Doctoral School of Sciences

The meetings of the Council of the Doctoral School of Sciences and the Doctoral supervisors of the Doctoral School of Sciences are regularly established and in Evidence (Annex A.1.1.1.e) are given.



f) The contract for doctoral studies is given in Annex A.1.1.1.f. There is two types of doctoral study contracts: both state budgeted (subsidised) and tuition fee.

g) In reference to the internal procedures for the analysis and approval of proposals regarding the training for doctoral study programs, the topics are proposed by the Doctoral supervisors and approved by the Council of the Doctoral School. Information regarding Doctoral research projects are publicly announced on the website www.ucv.ro, (Annex A.1.1.1.g).

In the visit, students were questioned about the internal procedures for the analysis and approval of proposals on the subject of university doctoral study programmes. They agree that the procedures are known and public.

Recommendations:

In the evaluation visit, students agree to know all the internal regulations and procedures of the university. Topics of research are proposed by researchers, but it would be desirable that IOSUD would perform a strategic design of topics of research involving researchers and students, in accordance with the research projects and calls of the Government and the University.

IOSUD should introduce and publish clearly the mechanisms for recognizing the status of a Doctoral advisor and the equivalence of the doctoral degree obtained abroad. Although they are mentioned in the Regulation of the Doctoral School of Sciences, they should clearly stated from supervisors and researchers from Romania and abroad. In summary, a well established mechanism should be implemented.

The indicator is fulfilled.

Performance Indicator A.1.1.2. *The doctoral school' Regulation includes mandatory criteria, procedures and standards binding on the aspects specified in Article 17, paragraph (5) of the Government Decision No. 681/2011 on the approval of the Code of Doctoral Studies with subsequent amendments and additions.*

The Regulation of the Doctoral School of Sciences (Annex A.1.1.2.) establishes mandatory criteria, procedures and standards binding on the aspects specified in Article 17, paragraph (5) of the Government Decision No. 681/2011 on the approval of the Code of Doctoral Studies with subsequent amendments and additions.

The findings from the institutional documents and the evaluation visits allow establishing the following facts:

a) the affiliation of new Doctoral supervisors: Articles 4 and 5 of the Regulations of the Doctoral School of Sciences;

b) the decision-making mechanisms Articles 12-16 of the Regulations of the Doctoral School of Sciences;



- c) the procedures for replacing the Doctoral supervisor of a Doctoral student: Article 43 of the Regulations of the Doctoral School of Sciences;
- d) the conditions under which the doctoral programme may be interrupted: Article 35 of the Regulations of the Doctoral School of Sciences;
- e) fraud prevention in scientific research: Article 38 of the Regulations of the Doctoral School of Sciences;
- f) access to research resources: Article 39 of the Regulations of the Doctoral School of Sciences;
- g) attendance obligations of Doctoral students: Article 29 of the Regulations of the Doctoral School of Sciences
- h) frequency obligations of students in Art. 13 - Art.15 for the preparation based on advanced studies, respectively Art.19 for the part related to the scientific research.

Recommendations: No specific recommendations.

The indicator is fulfilled.

Standard A.1.2. The IOSUD has the logistical resources necessary to carry out the doctoral studies' mission.

**general description of the standard analysis.*

Performance Indicator A.1.2.1. The existence and effectiveness of an appropriate IT system to keep track of doctoral students and their academic background.

From the documents provided by the University and the answers in the evaluation visit, it can be concluded the and effectiveness of an appropriate IT system to keep track of doctoral students and their academic background. The School of Physics has an adequate information system for the record of Doctoral students as well as their academic performance during the doctoral programme.

Important facts are that each student has an electronic page in which all the completed stages are recorded: exams, submitted research reports, grades for the research activity and participation in scientific events in the country or abroad resulting in the publication of papers.

Recommendations: The IT system is quite complete and appropriate. As a recommendation, prospective analysis and recommendations could be driven to the students based on the recorded data.

The indicator is fulfilled .



Performance Indicator A.1.2.2. *The existence and use of an appropriate software program and evidence of its use to verify the percentage of similarity in all doctoral theses.*

IOSUD University of Craiova, through a software purchased by the University of Craiova, owns an anti-plagiarism software.

As a question during the evaluation visit, it is informed that each PhD Student has the obligation to pass the thesis through the specialized software to get a similarity report before presenting the thesis in front of the guidance committee. The report is approved by the doctoral supervisor.

*Recommendations: **This similarity report could be included the student's electronic page in which all the completed stages are recorded.***

The indicator is fulfilled.

Standard A.1.3. The IOSUD makes sure that financial resources are used optimally, and the revenues obtained from doctoral studies are supplemented through additional funding besides governmental funding.

**general description of the standard analysis.*

Performance Indicator A.1.3.1. *Existence of at least one research or institutional / human resources development grant under implementation at the time of submission of the internal evaluation file, per doctoral study domain under evaluation, or existence of at least 2 research or institutional development / human resources grant for the doctoral study domain, obtained by doctoral thesis advisors operating in the evaluated domain within the past 5 years. The grants address relevant themes for the respective domain and, as a rule, are engaging doctoral students.*

The documents provided by the Doctoral School of Physics at the University of Craiova prove that the 7 supervisors are involved in research activities, both basic and applied.

The criterion establishes the existence of at least two research grants and they have it. In fact, the web page of the research group shows more examples of grants at the Doctoral School of Physics

*Recommendations: **No recommendations.***

The indicator is fulfilled .

Performance Indicator *A.1.3.2. *The percentage of doctoral students active at the time of the evaluation, who for at least six months receive additional funding sources besides government funding, through scholarships awarded by individual persons or by legal entities, or who are financially supported through research or institutional / human resources development grants is not less than 20%.*



A percentage of 36% of students are financially supported through research or institutional / human resources development grants. 4 of the 14 Doctoral students enrolled in the period 2015-2020 worked on a contract basis and obtained additional income to that provided by government funding. In April 2021 2 of 8 Doctoral students enrolled in Physics have benefited from other sources of financing for at least 6 months.

Recommendations: In the evaluation visit, students were asked for the sufficiency of the grants and they expressed they allow to live discreetly. In the future, an increase in financial support to research development grants would be desirable.

The indicator is fulfilled

Performance Indicator *A.1.3.3.² *At least 10% of the total amount of doctoral grants obtained by the university through institutional contracts and of tuition fees collected from the doctoral students enrolled in the paid tuition system is used to reimburse professional training expenses of doctoral students (attending conferences, summer schools, training, programs abroad, publication of specialty papers or other specific forms of dissemination etc.).*

The documents provided by the University of Craiova in Annex A.1.3.3 show that the Doctoral program has set up a special fund, in addition to the revenue related to doctoral grants, the Support Fund for Scientific Research Activity (SACS fund). These funds support young researchers, including Doctoral students, to participate in international conferences and the coverage of the publication fees in ISI listed journals.

Recommendations: Attendance to summer courses and training programs abroad or in the university should be encouraged and the University should provide financial support to these items.

The indicator is fulfilled.

² The indicators marked with an asterisk (*) hold a special status, referring exclusively to the evaluation of doctoral studies domains, as per Article 12 from the annex No.1 of the Order of the minister of education No. 3651/12.04.2021 approving the Methodology for evaluating university doctoral studies and the system of criteria, standards and performance indicators used in the evaluation. In case they are not met, the Agency extends a period of maximum 3 years to IOSUD to correct the respective deficiencies.



Criterion A.2. Research infrastructure

**general description of the criterion analysis.*

Standard A.2.1. The IOSUD has a modern research infrastructure to support the conduct of doctoral studies' specific activities.

**general description of the standard analysis.*

Performance Indicator A.2.1.1. *The venues and the material equipment available to the doctoral school enable the research activities in the evaluated domain to be carried out, in line with the assumed mission and objectives (computers, specific software, equipment, laboratory equipment, library, access to international databases etc.). The research infrastructure and the provision of research services are presented to the public through a specific platform. The research infrastructure described above, which was purchased and developed within the past 5 years will be presented distinctly.*

The venues and the material equipment available to the doctoral school enable the research activities in the Doctoral Physics domain. Library resources are appropriate as described in the web page of the University of Craiova and Equipping laboratories for teaching and research activities present in Annex A.2.1.1. are appropriate for the field of research.

The research infrastructure purchased and developed within the past 5 years in the Applied Physics and the Astronomy and Astrophysics are provided during the evaluation visit. They include relevant equipments in the Research and Education Centre ASTROED, and in the Laboratories of Material Sciences.

Recommendations: *The Doctoral program has relevant equipments and appropriate computers and software to develop its research. A provision of research services should be promoted at University level and the needs of further equipment should be established through a forecast of requirements for further research.*

The indicator is fulfilled.

Criterion A.3. Quality of Human Resources

**general description of the criterion analysis.*

Standard A.3.1. At the level of each domain there are sufficient qualified staff to ensure the conduct of doctoral study program.

**general description of the standard analysis.*



Performance Indicator A.3.1.1. *Minimum three doctoral thesis advisors within that doctoral domain, and at least 50% of them (but no less than three) meet the minimum standards of the National Council for Attestation of University Degrees, Diplomas and Certificates (CNATDCU) in force at the time when the evaluation is carried out, which standards are required and mandatory for obtaining the enabling certification.*

According to the Doctoral program documents, all 7 Doctoral supervisors in the field of Physics (100%) achieve the score imposed by the CNATDCU minimum standards in force, required and mandatory for the award of the certificate of habilitation.

Annex A.3.1.1. contains the evidences and more documents were provided during the evaluation visit for two other supervisors. They prove the supervisors meets the requirements.

Recommendations: No recommendations.

The indicator is fulfilled

Performance Indicator *A.3.1.2. *At least 50% of all doctoral advisors have a full-time employment contract for an indefinite period with the IOSUD.*

According to the Doctoral program documents, out of the seven doctoral supervisors, five are professors at the University of Craiova (71.42%), and the other two are researchers (28.58%) at research institutes in the country (14.29%) and abroad (14.29%).

In the evaluation visit, information were requested about the current status of profs. Constantinescu and Rotaru. The first one has the status of “titular” and the second one is retired but he has a full time contract with IOSUD. Both are considered as employed full time within IOSUD.

Recommendations: Since one professor is retired and he has a full time contract, being his contribution remarkable, for the sake of strengthening the programme, it should be established a plan for hiring new supervisors to consolidate the research line.

The indicator is fulfilled.

Performance Indicator A.3.1.3. *The study subjects in the education program based on advanced higher education studies pertaining to the doctoral domain are taught by teaching staff or researchers who are doctoral thesis advisors / certified doctoral thesis advisors, professors / CS I or lecturer / CS II, with proved expertise in the field of the study subjects they teach, or other specialists in the field who meet the standards established by the institution in relation with the aforementioned teaching and research functions, as provided by the law.*



Annex A.3.1.3. shows the subjects included in the training module related to Physics. They are proposed and taught by the Doctoral supervisors affiliated with the Doctoral School with proved expertise in the field of the study subjects they teach.

Recommendations: It should be desirable that students could propose training courses based on their identified needs.

The indicator is fulfilled.

Performance Indicator *A.3.1.4. The percentage of doctoral thesis advisors who concomitantly coordinate more than 8 doctoral students, but no more than 12, who are themselves studying in doctoral programs³ does not exceed 20%.

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself

In the Doctoral field of Physics at IOSUD University of Craiova, there is a total of 6 Doctoral students in the field of doctoral studies in Physics. They are assigned to 4 of the Doctoral supervisors.

Recommendations: No recommendations

The indicator is fulfilled.

Standard A.3.2. The Doctoral advisors within the domain are carrying out a scientific activity visible at international level.

**general description of the standard analysis.*

Performance Indicator A.3.2.1. At least 50% of the doctoral thesis advisors in the evaluated domain have at least 5 Web of Science- or ERIH-indexed publications in magazines of impact, or other achievements of relevant significance for that domain, including international-level contributions that indicate progress in scientific research - development - innovation for the evaluated domain. The aforementioned doctoral thesis advisors enjoy international awareness within the past five years, consisting of: membership on scientific boards of international publications and conferences; membership on boards of international professional associations; guests in conferences or expert groups working abroad, or membership on doctoral defense commissions at universities abroad or co-leading with universities abroad. For Arts and Sports and Physical Education Sciences, doctoral thesis advisors shall

³ 3 years for the doctoral university studies with the duration stipulated at Article 159, paragraph (3), respectively 4 years for the doctoral university studies with the duration stipulated at Article 174, paragraph (3) of the Law of national education No.1/2011 with subsequent amendments and additions, with additional extension periods approved as per Article 39, paragraph (3) of the Code of doctoral studies approved by the GD No. 681/2011 with subsequent amendments and additions.



prove their international visibility within the past five years by their membership on the boards of professional associations, membership in organizing committees of arts events and international competitions, membership on juries or umpire teams in artistic events or international competitions.

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova, all 7 Doctoral supervisors affiliated with the doctoral school of Physics at UCV are scientifically active and have relevant contributions in the field of Physics. Publications and other achievements are significant in the area. The doctoral thesis advisors enjoy international awareness within the past five years.

Recommendations: No recommendations.

The indicator is fulfilled.

Performance Indicator *A.3.2.2. At least 50% of the doctoral thesis advisors in a specific doctoral study domain continue to be active in their scientific field, and acquire at least 25% of the score requested by the minimal CNATDCU standards in force at the time of the evaluation, which are required and mandatory for acquiring their enabling certificate, based on their scientific results within the past five years.

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova and the table presented in A.3.1.1, at least 25% of the CNATDCU habilitation standards based on the scientific performance in the last 5 years is fulfilled by the doctoral supervisors in the field of Physics and all are active in their scientific field.

Recommendations: No recommendations.

The indicator is fulfilled.



Domain B. EDUCATIONAL EFFECTIVENESS

**general description of domain analysis.*

Criterion B.1. The number, quality and diversity of candidates enrolled for the admission contest

**general description of the criterion analysis.*

Standard B.1.1. The institution organizing doctoral studies has the capacity to attract candidates from outside the higher education institution or a number of candidates exceeding the number of seats available.

**general description of the standard analysis.*

Performance Indicator *B.1.1.1. *The ratio between the number of graduates of masters' programs of other higher education institutions, national or foreign, who have enrolled for the doctoral admission contest within the past five years and the number of seats funded by the state budget, put out through contest within the doctoral domain is at least 0.2 or the ratio between the number of candidates within the past five years and the number of seats funded by the state budget put out through contest within the doctoral studies domain is at least 1,2.*

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova the ratio between the number of Doctoral students who graduated from the Master's at other higher education institutions in the country or abroad and the total number of Doctoral students enrolled in the same period in the doctoral school of Physics is $9/14 = 0.6 (> 0.2)$. The ratio between the number of candidates (14) and the number of places financed from the budget (10) is $1.4 (> 1.2)$.

Recommendations: *It would be desirable to increase the number of students and subsidised places, so the ratio between the number of candidates within the past five years and the number of seats funded by the state budget put out through contest within the doctoral studies domain become increased in the following years. An action plan to attract potential students (national and international ones) is recommended.*

The indicator is fulfilled .

Standard B.1.2 Candidates admitted to doctoral studies demonstrate academic, research and professional performance.

**general description of the standard analysis.*

Performance Indicator *B.1.2.1. *Admission to doctoral study programs is based on selection criteria including: previous academic, research and professional performance, their interest for scientific or arts/sports research, publications in the domain and a proposal for a research subject. Interviewing the candidate is compulsory, as part of the admission procedure.*



According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova, admission to doctoral study programs is based on selection criteria including that their final grades in the previous cycles (Bachelor's, Master's) have to be at least 8.00. Research skills are verified during the entrance examination including publications, participation in conferences, or other scientific achievements of the candidates. Interviewing the candidate is compulsory, as part of the admission procedure, and is based on a topic proposed by the supervisor and announced at least 6 months in advance

*Recommendations: **No specific recommendations.***

The indicator is fulfilled.

Performance Indicator B.1.2.2. *The expelling rate, including renouncement / dropping out of doctoral students 3, respectively 4, years after admission⁴ does not exceed 30%.*

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova, out of the 14 Doctoral students who enrolled between 2015 and 2020, either state-budgeted or fee-paying, two dropped out. The dropout rate is therefore $2/14 = 0.13$, i.e. 13% <30%.

*Recommendations: **Reasons of dropping out of doctoral students should be analysed to prevent them.***

The indicator is fulfilled .

Criterion B.2. The content of doctoral programs

**general description of the criterion analysis.*

Standard B.2.1. The training program based on advanced university studies is appropriate to improve doctoral students' research skills and to strengthen ethical behavior in science.

**general description of the standard analysis.*

Performance Indicator B.2.1.1. *The training program based on advanced academic studies includes at least 3 disciplines relevant to the scientific research training of doctoral students; at least one of these disciplines is intended to study in-depth the research methodology and/or the statistical data processing.*

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova in Annex B.2.1. the curriculum contains relevant subjects for the training of Doctoral students in scientific research. There is actually a package of 9 subjects out of which the Doctoral

⁴ 3 years for the doctoral university studies with the duration stipulated at Article 159, paragraph (3), respectively 4 years for the doctoral university studies with the duration stipulated at Article 174, paragraph (3) of the Law of national education No. 1/2011 with subsequent amendments and additions.



student, at the suggestion of the doctoral supervisor, chooses two subjects. Two are compulsory: Research Methodology in the field of Physics and Ethics and Academic Integrity.

Recommendations: Training program is appropriate but a plan for updating the program and include skills on software programs or other skills suggested by the students would be desirable.

The indicator is fulfilled .

Performance Indicator B.2.1.2. At least one discipline is dedicated to Ethics and Intellectual Property in scientific research or there are well-defined topics on these subjects within a discipline taught in the doctoral program.

The program includes the subject –Ethics and Academic Integrity.

Recommendations: **No specific recommendations.**

The indicator is fulfilled.

Performance Indicator B.2.1.3. The IOSUD has mechanisms to ensure that the academic training program based on advanced university studies addresses „the learning outcomes”, specifying the knowledge, skills, responsibility and autonomy that doctoral students should acquire after completing each discipline or through the research activities⁵.

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova, the subjects in the curriculum and research activities are specified in the content of the course description, Annex A.3.1.3. They reflect the competences, skills and aptitudes that Doctoral students must possess.

Recommendations: It should be stressed the mechanisms to ensure that the academic training program addresses the learning outcomes. The Doctoral program should establish a correlation between the degree of knowledge and skills acquired in each subjects and the level required in the Doctoral studies.

The indicator is fulfilled.

⁵ Or by what the graduate should know, understand and to be able to do, according to the provisions of the Methodology of 17 March 2017 regarding inscription and registration of higher education qualifications in the National Register of Qualifications in Higher Education (RNCIS) approved by the Order No.3475/2017 with subsequent amendments and additions.



Performance Indicator B.2.1.4. All along the duration of the doctoral training, doctoral students in the domain receive counselling/guidance from functional guidance commissions, which is reflected in written guidance and feedback or regular meeting.

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova in Annex B.2.1.4., doctoral studies benefit from advisory committees consisting of the Doctoral supervisor and 3 specialist members, professors or researchers in the field of doctoral topics.

In the evaluation visit, students show a good degree of satisfaction with this guidance.

Recommendations: No specific recommendations.

The indicator is fulfilled .

Performance Indicator B.2.1.5. For a doctoral study domain, the ratio between the number of doctoral students and the number of teaching staff/researchers providing doctoral guidance must not exceed 3:1.

Annex B.2.1.4 shows that, there are 16 distinct members in the advisory committees of the 14 Doctoral students in Physics.

Recommendations: No specific recommendations.

The indicator is fulfilled .

Criterion B.3. The results of doctoral studies and procedures for their evaluation.

**general description of the criterion analysis.*

Standard B.3.1. Doctoral students capitalize on the research through presentations at scientific conferences, scientific publications, technological transfer, patents, products and service orders.

**general description of the standard analysis.*

Performance Indicator B.3.1.1. For the evaluated domain, the evaluation commission will be provided with at least one paper or some other relevant contribution per doctoral student who has obtained a doctor's title within the past 5 years. From this list, the members of the evaluation commission shall randomly select 5 such papers / relevant contributions per doctoral study domain for review. At least 3 selected papers must contain significant original contributions in the respective domain.

According to the statements in Annex B.1.1.1, in the period 2015 - 2020 a total number of 9 Doctoral students in the field of Physics publicly defended their Doctoral theses. The list provided includes 29 papers published in ISI-rated journals (on average 3.2 ISI papers / thesis) and about 20 papers presented at conferences and published in indexed journals or proceedings. (2.2 papers / thesis).



In the above mentioned annex, there are also listed 9 papers (of which 5 published in ISI journals) already published by the 8 students who were still enrolled in the doctoral programme at the time of drafting this self-evaluation report.

The evaluation shows that all doctoral student who has obtained a doctor's title within the past 5 years have relevant contributions and the list of reviewed papers contain significant original contributions in the physics domain.

*Recommendations: **No recommendations.***

The indicator is fulfilled .

Performance Indicator *B.3.1.2. *The ratio between the number of presentations of doctoral students who completed their doctoral studies within the evaluated period (past 5 years), including posters, exhibitions made at prestigious international events (organized in the country or abroad) and the number of doctoral students who have completed their doctoral studies within the evaluated period (past 5 years) is at least 1.*

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova in Annex B.3.1.1, the following conclusions

- The 9 Doctoral students presented about 20 scientific papers at scientific conferences, therefore the ratio being $20/9 = 2, 2 > 1$
- Each of the 9 Doctoral students had at least one presentation at a conference.

In the evaluation visit, information on papers presented in conferences is provided and this information proves this criterion is met.

Recommendations: No recommendations.

The indicator is fulfilled

Standard B.3.2. The Doctoral School engages a significant number of external scientific specialists in the commissions for public defense of doctoral theses in the analyzed domain.

**general description of the standard analysis.*

Performance Indicator *B.3.2.1. *The number of doctoral theses allocated to one specialist coming from a higher education institution, other than the evaluated IOSUD should not exceed two (2) in a year for the theses coordinated by the same doctoral thesis advisor.*

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova in Annex B.3.2.1. In the evaluation visit, Prof. Radu produced and attached here a list with all the 9 commissions, as well as the official files attesting the missing commissions (file SA_3).



It can be seen that there are no specialists who participated in more than two thesis defence committees in the same year so the criterion is met.

Recommendations: No specific recommendations.

The indicator is fulfilled

Performance Indicator *B.3.2.2. *The ratio between the doctoral theses allocated to one scientific specialist coming from a higher education institution, other than the institution where the defense on the doctoral thesis is organized, and the number of doctoral theses presented in the same doctoral study domain in the doctoral school should not exceed 0.3, considering the past five years. Only those doctoral study domains in which minimum ten doctoral theses have been presented within the past five years should be analyzed.*

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova There are 9 theses defended in the last 5 academic years and the indicator establishes that only those doctoral study domains in which minimum ten doctoral theses have been presented within the past five years should be analyzed. Up to now, considering Annex B.3.2.1, the requirement that a scientific reviewer must not be included in more than two thesis defense committees is met.

Recommendations: No specific recommendations.

The indicator is fulfilled.



Domain C. QUALITY MANAGEMENT

**general description of domain analysis.*

Criterion C.1. Existence and periodic implementation of the internal quality assurance system

**general description of the criterion analysis.*

Standard C.1.1. There are an institutional framework and procedures in place and relevant internal quality assurance policies, applied for monitoring the internal quality assurance.

**general description of the standard analysis.*

Performance Indicator C.1.1.1. *The Doctoral school in the respective university study domain shall demonstrate the continuous development of the evaluation process and its internal quality assurance following a procedure developed and applied at the level of the IOSUD, the following assessed criteria being mandatory:*

- (a) the scientific work of Doctoral advisors;*
- (b) the infrastructure and logistics necessary to carry out the research activity;*
- (c) the procedures and subsequent rules based on which doctoral studies are organized;*
- (d) the scientific activity of doctoral students;*
- (e) the training program based on advanced academic studies of doctoral students;*
- (f) social and academic services (including for participation at different events, publishing papers etc.) and counselling made available to doctoral students.*

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova, IOSUD - University of Craiova has developed and periodically applies a procedure for the evaluation and internal quality assurance of doctoral schools and of doctoral fields.

In the case of the doctoral school of Physics, the self-evaluation report contains a distinct chapter and it can be consulted at: <http://stiinte.ucv.ro/doctorat/rapoarte/>

The required criteria are addressed in this procedure, i.e.

- (a) the scientific work of Doctoral advisors;**
- (b) the infrastructure and logistics necessary to carry out the research activity;**
- (c) the procedures and subsequent rules based on which doctoral studies are organized;**
- (d) the scientific activity of doctoral students;**
- (e) the training program;**
- (f) social and academic services and counselling made available to doctoral students, at a not very detailed level.**

Recommendations: **The internal quality assurance applied at the level of the IOSUD should produce public periodic reports and data to be analysed. The self evaluation report is an evidence, but data and their analysis should be given in prescribed procedures and their analysis made with a greater periodicity.**



The indicator is fulfilled .

Performance Indicator *C.1.1.2. *Mechanisms are implemented during the stage of the doctoral study program to enable feedback from doctoral students allowing to identify their needs, as well as their overall level of satisfaction with the doctoral study program in order to ensure continuous improvement of the academic and administrative processes. Following the analysis of the results, there is evidence that an action plan was drafted and implemented.*

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova, in Annex C.1.1.2. and http://cis01.central.ucv.ro/manag_ac_ad/2009/files/8%20Chestionar_evaluarea_satisfactiei_studentului_EI.pdf ; it is presented a questionnaire on the degree of satisfaction of Doctoral students and a guide for filing in the online questionnaire.

There is neither evidence of analysis of the results nor that an action plan was drafted and implemented. The reduced number of students allows to perform a monitoring of the student, but there are no data collected as a regulated procedure.

Recommendations: The Doctoral program should apply mechanisms during the stage of the doctoral study program to collect information and analyse this information. The collected information should enable to identify the doctoral student's needs, as well as their overall level of satisfaction. The analysis of the information and the results should end up in an action plan implemented in order to ensure continuous improvement of the academic and administrative processes.

The indicator is partially fulfilled

Criterion C.2. Transparency of information and accessibility of learning resources

**general description of the criterion analysis.*

Standard C.2.1. Information of interest to doctoral students, future candidates and public interest information is available for electronic format consultation.

**general description of the standard analysis.*

Performance Indicator C.2.1.1. *The IOSUD publishes on the website of the organizing institution, in compliance with the general regulations on data protection, information such as:*

- (a) the Doctoral School regulation;*
- (b) the admission regulation;*
- (c) the doctoral studies contract;*



(d) the study completion regulation including the procedure for the public presentation of the thesis;

(e) the content of training program based on advanced academic studies;

(f) the academic and scientific profile, thematic areas/research themes of the Doctoral advisors within the domain, as well as their institutional contact data;

(g) the list of doctoral students within the domain with necessary information (year of registration; advisor);

(h) information on the standards for developing the doctoral thesis;

(i) links to the doctoral theses' summaries to be publicly presented and the date, time, place where they will be presented; this information will be communicated at least twenty days before the presentation.

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova, the Doctoral School of Sciences has its own web page, apart from the one of the IOSUD University of Craiova. The information is provided in <http://stiinte.ucv.ro/doctorat/> or by following the corresponding links on the IOSUD web page https://www.ucv.ro/invatamant/educatie/programe_doctorat/prezentare_programe_de_doctorat.php

Information provided in the web page includes

(a) the Doctoral School regulation;

(b) the admission regulation;

(c) the doctoral studies contract;

(d) the study completion regulation

(e) the content of training program ;

(f) the academic and scientific profile of supervisors;

(g) the list of doctoral students within the domain with necessary information (year of registration; advisor);

(h) information on the standards for developing the doctoral thesis; (partially addressed, the link to the regulations and specific standard should be included)

(i) links to the doctoral theses' summaries .

Recommendations: The information provided in English does not contains all the information mentioned in the standard. It should be desirable to get a complete English version of the web page.

The information on the standards for developing the doctoral thesis should be revised in the web page to include clearly the link to the general regulations and specific standards (although the general rules anre in the Regulations of the Doctoral School of Sciences it will be helpful to be clearly shown here).



The indicator is fulfilled.

Standard C.2.2. The IOSUD/The Doctoral School provides doctoral students with access to the resources needed for conducting doctoral studies.

**general description of the standard analysis.*

Performance Indicator C.2.2.1. All doctoral students have free access to one platform providing academic databases relevant to the doctoral studies domain of their thesis.

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova in Annex C.2.2.1, all Doctoral students at the University of Craiova have free access to relevant academic databases in the field of PHYSICS: ISI Web of Science, Science Direct Journals, SpringerLink, Cambridge Journals, Taylor and Francis, IEEE and AIP.

*Recommendations: **No recommendations.***

The indicator is fulfilled

Performance Indicator C.2.2.2. Each doctoral student shall have access, upon request, to an electronic system for verifying the degree of similarity with other existing scientific or artistic works.

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova in Annex A.1.2.2 , the University of Craiova has purchased a dedicated software for verifying the degree of similarity with other existing scientific or artistic creations.

In the evaluation visit it was asked for the procedure, which is mentioned in the Regulations of the Doctoral School of Sciences:

- **Art.22(3) mentions that the PhD supervisor and the Guidance commission established for each PhD student have to check the thesis and to give their written agreement for its public defence (there is a specific template at the IOSUD level).**
- **Art.27(1) mentions the steps to be followed, including details on the similarity check.**

*Recommendations: **No recommendations***

The indicator is fulfilled.

Performance Indicator C.2.2.3. All doctoral students have access to scientific research laboratories or other facilities depending on the specific domain/domains within the Doctoral School, according to internal order procedures.



According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova in Annex A.2.1.1, there are internal regulations, based on which Doctoral students in the field of Physics have access to all the facilities that the faculty provides: laboratories, libraries and other research facilities. In Art.9 is mentioned as a right of the PhD student “to use laboratories, lecture and seminar rooms, reading rooms, libraries and other means provided by IOSUD”.

In the visit it was asked about this issue and the Study contract signed by University, student and supervisor (see Annex A.1.1.1.f) is an example of this.

Recommendations: No specific recommendations.

The indicator is fulfilled.

Criterion C.3. Internationalization

**general description of the criterion analysis.*

Standard C.3.1. There is a strategy in place and it is applied to enhance the internationalization of doctoral studies.

**general description of the standard analysis.*

Performance Indicator *C.3.1.1. *IOSUD, for every evaluated domain, has concluded mobility agreements with universities abroad, with research institutes, with companies working in the field of study, aimed at the mobility of doctoral students and academic staff (e.g., ERASMUS agreements for the doctoral studies). At least 35% of the doctoral students have completed a training course abroad or other mobility forms such as attending international scientific conferences. IOSUD drafts and applies policies and measures aiming at increasing the number of doctoral students participating at mobility periods abroad, up to at least 20%, which is the target at the level of the European Higher Education Area.*

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova in Annex C.3.1.1., The doctoral field of PHYSICS, through the Doctoral School of Physics, has concluded mobility agreements with Universities abroad and with research institutes. The list of partner institutions within the Erasmus+ programme is presented in the document and is relevant.

More than 50% of Doctoral students completed a training course abroad or other form of mobility (participation in international conferences), so the indicator is met. In the Report is given a list with 7 examples of PhD students who benefited by stages abroad or who were supported for participating in conferences. It is also mentioned that they organized, between September 24-27 2020, the online Doctoral School “Computational Methods in Theoretical Physics”, where 4 PhD Students in Physics and Mathematics participated.

The number of doctoral students participating at mobility periods abroad, up to at least 20%, which is the target at the level of the European Higher Education Area is not clearly shown in the reports.



Recommendations: IOSUD should clearly state and apply policies and measures aiming at increasing the number of doctoral students participating at mobility periods abroad. These measurements are not explicitly given.

The indicator is fulfilled .

Performance Indicator C.3.1.2. In the evaluated doctoral study domain, support is granted, including financial support, to the organization of doctoral studies in international co-tutelage or invitation of leading experts to deliver courses/lectures for doctoral students.

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova, international professors are invited to deliver lectures for Doctoral students. In 2015-2020 they benefitted from the lectures delivered by Vladimir Gerdjikov - Bulgaria, Lars Brink - Sweden, Cristian Sarpe - Germany, Filippo Parisi - Italy. The supervisors also prompt the presence of specialists from abroad in the doctoral commissions.

In the evaluation visit, it was asked to the question of granting support including financial support, to the organization of doctoral studies in international co-tutelage. The Doctoral field of Physics did not establish a real cotutelle agreement with another University.

Supervisors of the program inform during the visit that there were “unofficial” cotutelles with specialists from abroad.

Recommendations: It is clear that cooperation with experts from abroad is done in the Doctoral program, but international co-tutelage should be developed in a formal way.

The indicator is partially fulfilled.

Performance Indicator C.3.1.3. The internationalization of activities carried out during the doctoral studies is supported by IOSUD through concrete measures (e.g., by participating in educational fairs to attract international doctoral students; by including international experts in guidance committees or doctoral committees etc.).

According to the documents provided by the Doctoral field of Physics at IOSUD University of Craiova, Participation of international experts in committees is shown, but concrete measures are missing. The doctoral program does not have agreements for thesis in cotutelle., and each of the 9 PhD theses defended from 2015 to 2020 had an extended summary in English (30-40 pages), but no one was written or presented in another language.

Recommendations: The Doctoral field of Physics at IOSUD University of Craiova should promote and support the internationalization of activities carried out during the doctoral studies through concrete measures (e.g., by participating in educational fairs to attract international doctoral



students; by including international experts in guidance committees, increasing the cooperation with other EU countries etc.):

The indicator is partially fulfilled.

IV. SWOT Analysis

<p><u>Strengths:</u></p> <p><i>Quality of Human Resources, the level of qualified staff to ensure the conduct of doctoral study program is very high.</i></p> <p><i>The IOSUD has the logistical resources necessary to carry out the doctoral studies' mission. The IOSUD has a modern research infrastructure to support the conduct of doctoral studies' specific activities.</i></p>	<p><u>Weaknesses:</u></p> <p><i>The number and diversity of candidates enrolled for the admission contest is relatively low, given the potential of the program. The institution organizing doctoral studies should strengthen the capacity to attract candidates from the higher education institution and outside.</i></p> <p><i>The strategy put in place and applied to enhance the internationalization of doctoral studies is weak. Further support is needed and a firm strategy to achieve this goal is needed.</i></p>
<p><u>Opportunities:</u></p> <p><i>The training program based on advanced university studies is appropriate to improve transfer to the economic sector and to increase collaboration with enterprises and industries.</i></p> <p><i>Candidates admitted to doctoral studies demonstrate good academic, research and professional performance and, in this context, PhD thesis in collaboration with industry should be encouraged.</i></p> <p><i>The economic environment of the University of Craiova and the international recognition in the Sciences field should be further taken into account by increasing public interest information and dissemination of activities of the program.</i></p>	<p><u>Threats:</u></p> <p><i>Given the relatively reduced number of supervisors, and that one supervisor is retired, the permanence of a qualified staff to ensure the conduct of doctoral study program should be guaranteed.</i></p> <p><i>Technological transfer, patents, products and service orders are not adequately capitalized on the research of Doctoral students. To ensure financial support these aspects should be improved.</i></p> <p><i>The relatively reduce number of students engaged in the Doctoral Program should be considered to ensure the maintenance of the programme.</i></p>

V. Overview of judgments awarded and of the recommendations

No.	Type of indicator (*, C)	Performance indicator	Judgment	Recommendations
1	c	<i>Performance Indicator A.1.1.1.</i>	Fulfilled	<p><i>Topics of research are proposed by researchers, but it would be desirable that IOSUD would perform a strategic design of topics of research involving researchers and students, in accordance with the research projects and calls of the Government and the University.</i></p> <p><i>IOSUD should introduce and publish clearly the mechanisms for recognizing the status of a Doctoral advisor and the equivalence of the doctoral degree obtained abroad.</i></p>
2	c	<i>Performance Indicator A.1.2.1.</i>	Fulfilled	<i>The IT system is quite complete and appropriate. As a recommendation, prospective analysis and recommendations could be driven to the students based on the recorded data.</i>
3	c	<i>Performance Indicator A.1.2.2.</i>	Fulfilled	<i>This similarity report could be included the student;s electronic page in which all the completed stages are recorded.</i>
4	*	<i>Performance Indicator *A.1.3.2.</i>	Fulfilled	<i>In the evaluation visit, students were asked for the sufficiency of the grants and they expressed they allow to live discreetly. In the future, an increase in financial support to research development grants would be desirable.</i>
5	*	<i>Performance Indicator *A.1.3.3</i>	Fulfilled	<i>Attendance to summer courses and training programs abroad or in the university should be encouraged and the University should provide financial support to these items.</i>

6	c	Performance Indicator A.2.1.1.	Fulfilled	<i>The Doctoral program has relevant equipments and appropriate computers and software to develop its research. A provision of research services should be promoted at University level and the needs of further equipment should be established through a forecast of requirements for further research.</i>
7	*	Performance Indicator *A.3.1.2.	Fulfilled	<i>Since one professor is retired and he has a full time contract, being his contribution remarkable, for the sake of strengthening the programme, it should be established a plan for hiring new supervisors to consolidate the research line.</i>
8	c	Performance Indicator A.3.1.3.	Fulfilled	<i>It should be desirable that students could propose training courses based on their identified needs.</i>
9	*	Performance Indicator *B.1.1.1.	Fulfilled	<i>It would be desirable to increase the number of students and subsidised places, so the ratio between the number of candidates within the past five years and the number of seats funded by the state budget put out through contest within the doctoral studies domain become increased in the following years. An action plan to attract potential students (national and international ones) is recommended.</i>
10	c	Performance Indicator B.2.1.1	Fulfilled	<i>Training program is appropriate but a plan for updating the program and include skills on software programs or other skills suggested by the students would be desirable.</i>
11	c	Performance Indicator B.2.1.3	Fulfilled	<i>It should be stressed the mechanisms to ensure that the academic training program addresses the learning outcomes. The Doctoral program should establish a correlation between the</i>

				<i>degree of knowledge and skills adquired in each subjects and the level required in the Doctoral studies.</i>
12	c	Performance Indicator C.1.1.1	Fulfilled	<i>The internal quality assurance applied at the level of the IOSUD should produce public periodic reports and data to be analysed. The self evaluation report is an evidence, but data and their analysis should be given in prescribed procedures and their analysis made with a greated periodicity.</i>
13	*	Performance Indicator *C.1.1.2.	Partially Fulfilled	<i>The Doctoral program should apply mechanisms during the stage of the doctoral study program to collect information and analyse this information. The collected information should enable to identify the doctoral student's needs, as well as their overall level of satisfaction. The analysis of the information and the results should end up in an action plan implemented in order to ensure continuous improvement of the academic and administrative processes.</i>
14	c	Performance Indicator C.2.1.1	Fulfilled	<i>The information provided in English does not contains all the information mentioned in the standard. It should be desirable to get a complete English version of the web page. The information on the standards for developing the doctoral thesis should be revised in the web page to include clearly the link to the general regulations and specific standards (although the general rules anre in the Regulations of the Doctoral School of Sciences it will be helpful to be clearly shown here).</i>
15	*	Performance Indicator *C.3.1.1.	Fulfilled	<i>IOSUD should clearly state and apply policies and measures aiming at increasing the number of doctoral students participating at mobility periods</i>

				<i>abroad. These measurements are not explicitly given.</i>
16	c	<i>Performance Indicator C.3.1.2</i>	Partially Fulfilled	<i>It is clear that cooperation with experts from abroad is done in the Doctoral program, but international co-tutelage should be developed in a formal way.</i>
17	c	<i>Performance Indicator C.3.1.3.</i>	Partially Fulfilled	<i>The Doctoral field of Physics at IOSUD University of Craiova should promote and support the internationalization of activities carried out during the doctoral studies through concrete measures (e.g., by participating in educational fairs to attract international doctoral students; by including international experts in guidance committees, increasing the cooperation with other EU countries etc.).</i>



VI. Conclusions and general recommendations

After revising the documents provided by the Doctoral Field of Physics from IOSUD – UNIVERSITY OF CRAIOVA of the Doctoral School of Sciences and the evaluation visit, the main conclusion is that the doctoral field of Physics has a well established quality of human resources and that the level of qualified staff is very high. Resources and commimment of the IOSUD are also relevant and the Doctoral program fulfill all the criteria, either fully or partially.

Generally speaking, the Physics domain of the Doctoral School of Sciences shows a relevant scientific and teaching performance. Evidence of this fact are the numerous published ISI papers, participation in international conferences, appearances in important committees and committees abroad, etc. The performance of the program is remarkable.

Given the data provided, the analysis of this report and the evidences presented, my main recommendation is that the program should maintain its accreditation.

Some recommendations are given in section V to improve the program, but neither of them are critical. As a general recommendation it would be desirable that IOSUD strenghtens the internal quality assurance applied at the level of the IOSUD to collect quality data to allow a sistematic analysis of weaknnesses and implement improvement plans. IOSUD should also promote in this program the link with industry and transfer its knowledge to the economical sector.

Another point that I can recommend is to establish research lines based in a institutional strategy, to guide the research to fields that require attention or interest in the future, aligned to the research policies. The research fields should not only be based on the justifiable interest of the supervisors but also in the focus of prospective students and their future employability.

Finally, it should be recommended the formalisation of international relations and increasing the support from IOSUD in this area.

*Signature: Prof. Diego P. Ruiz-Padillo
University of Granada
Spain*



VII. Annexes

The following documents are given in separate files attached:

- *ANNEX 1. Documents provided for IOSUD Physics Domain for Domain A*
- *ANNEX 2. Documents provided for IOSUD Physics Domain for Domain B*
- *ANNEX 3. Documents provided for IOSUD Physics Domain for Domain C*
- *ANNEX 4 detailed schedule of the evaluation visit.*
- *ANNEX 5. Panel members of IOSUD University of Craiova*