Annex No. 3

External Evaluation Report
Doctoral Study Domain Physics
Babes-Bolyai University of Cluj-Napoca

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I. Introduction[1]

This report summarizes my impressions as ARACIS International Expert Evaluator of the Doctoral Study Domain Physics within Babes-Bolyai University of Cluj-Napoca (UBB) Romania. The evaluation of university Doctoral Domain Physics at the West University Timisoara was carried out by ARACIS in view of maintaining accreditation, procedure of quality assurance aimed to certify fulfillment of operating standards by the institutions organizing university doctoral studies, based on the provisions of art. 4 para. (2) of the Government Emergency Ordinance no. 75/2005 on Quality Assurance of Education, approved with amendments by the Law No. 87/2006, with subsequent amendments and additions.

The evaluation process was performed by the Romanian Agency for Quality Assurance in Higher Education (ARACIS), who recruited the following Experts Committee, in charge of Evaluation of the Doctoral Domain Physics at the Babes-Bolyai University of Cluj-Napoca (UBB) Romania:

Coordinator:
Prof. PhD Leontie Liviu
Universitatea „Alexandru Ioan Cuza" din Iași
International expert:
Prof. PhD. Razvan Ionut Ghinea
University of Granada, Spain
PhD student:
CERNUȘCĂ Bianca-Denisa
Universitatea de Vest din Timișoara

The evaluation period extended from 02/11/2021 to 05/11/2021, and it was developed in a hybrid mode, meaning that the evaluation benefited from both online meetings and on-site visits.

After my appointment as an International Expert Evaluator, I was informed by the Director (Prof. dr. ing. LACHE Simona, Universitatea Transilvania din Brașov), the Coordinator (Prof. dr. MOLDOVAN Nicoleta, Universitatea de Vest din Timișoara) as well as the Technical Assistant (Luminita Parv- ARACIS) of the evaluation team on important aspects of the evaluation process, such as:

- Working methodology and the structure of the evaluation panels, for IOSUD and doctoral study domains, including contact data;
- Doctoral Study Domain that was going to be evaluated;
- All important working documents, such as The Guidelines for Periodical External Evaluation of the Institution Organizing Doctoral Study Programs (IOSUD), respectively of the Doctoral study domains; The Doctoral Studies Code of June 29th, 2011 and the Order no. 3651/12.04.2021 for the approval of the Methodology on conducting the evaluation of university doctoral studies and of the systems of criteria, standards and performance indicators used in the evaluation; General presentation of the HE and QA systems in Romania.
- Detailed on-line meetings and visit schedule;
- Credentials and how to access the Internal evaluation reports and their annexes uploaded by the evaluated institution.

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

Background

Doctoral School (DS) of Physics of the Babeș-Bolyai University was founded in 2002 when inside the Babeș-Bolyai University all academic studies were reorganized. According to a Decision of the Administration Council of the Babeș-Bolyai University on 2001 all doctorate programs were restructured according to the national Romania education law 1999 HG 37/1999. In 2006, the Institute for Doctoral Studies of UBB was established, a moment representing the starting point in organizing the Doctoral Schools at UBB. Doctoral School of Physics is an administrative structure of the Faculty of Physics.

Faculty of Physics has only one accredited doctoral field, Physics field, and only one doctoral school, Doctoral School of Physics (DS Physics). The mission of the DS Physics is to offer the doctoral students the organizational framework, the expertise of scientific and teaching staff and the research infrastructure to acquire all skills and knowledge in the field of physics with the final goal of obtaining the doctoral title. DS Physics s functioning as a department included in the structure of the Faculty of Physics and belonging directly to the Institute for Doctoral Studies of UBB. PhD supervisors tackle in the doctoral thesis up-to-date research topics and obtain original scientific results which lead to new research directions at the Faculty of Physics such as: Eco-nanotechnologies and advanced materials, Plasmonics, Materials for environmental applications, Materials for tissue engineering, Theoretical/Computational studies of molecular clusters, Theoretical/Computational studies of genetic biopolymers, Theoretical investigations of the structure and molecular properties by ab initio methods, Collective phenomena, dinamic systems, Econophysics, Mesoscopic spintronic devices, The effect of light interaction with conjugated polymers, etc.

The activity of the DS is coordonated by the Doctoral School Council, which consists of 6 members: 4 PhD Supervisors and 2 PhD Students. The current structure of the Doctoral School Council is:

- Prof. dr. Simion Aştilean - Director
- Prof. dr. Radu Silaghi-Dumitrescu
- Prof. dr. Leontin David
- Assoc.Prof.dr. Habil. Monica Baia
- Drd. Răzvan Costinaş
- Drd. Alexandru Hada

Secretary: Teodora-Diana Chiș

The Doctoral School of Physics operates with only one doctoral field of study, the field of Physics, with a total of 23 PhD Supervisors. Currently, there are 41 PhD students enrolled at the Doctoral School under the supervision of 20 PhD Supervisors. The Doctoral School of Physics at UBB provides the organizational and functional framework for doctoral students in the field of physics so that they can carry out excellent scientific research to strengthen the field of physics at UBB, nationally and internationally.

The doctoral school offers doctoral students a training program based on advanced university studies consisting of courses, seminars, laboratories, and various specific activities. Another important aspect is that each PhD student benefits from the existence of an individual Guidance Commission, that will help and assess each PhD Student throughout the development of the PhD thesis.

All PhD students have access to several research facilities located within the Faculty of Physics at UBB. A great part of the research facilities and/or research equipment was either built or acquired in the

last 5 years, which proves the continuous effort of the evaluated institution to provide its students with the best resources for the proper development of their PhD Thesis.
UBB has teaching spaces, offices and conference rooms that can be used by both PhD supervisors and PhD students. Finally, PhD Students have access to electronic documentation resources provided through online platforms on an IP-based access as well as physical documentation resources through the Central University Library.

II. Methods used

Self-Assessment Report

The institution has taken the evaluation process very seriously and carefully prepared a *Self-Assessment Report* of the Physics Doctoral Domain. This document was available as 67 pages .pdf document in the ARACIS cloud, and I was able to access it easily, on-time and as often as necessary. To support information included in the *Self-Assessment Report*, the evaluated institution also included a total of 298 Annexes, that were later completed with other additional documents, upon request from the evaluation panel. All these documents were uploaded to the ARACIS cloud or sent directly by e-mail to the evaluation panel. No physical documents were requested during the evaluation visit.

Additional Information available on-line

To complete this evaluation report, documents, data, and information available on the IOSUD/Doctoral School(s) website, in electronic format was also frequently consulted:

- http://www.phys.ubbcluj.ro/departamente/sd.htm
- https://www.doctorat.ubbcluj.ro

Similarly, webpages corresponding to research facilities and other aspects mentioned in the Self-Assessment Report were consulted to verify the provided information:

- http://phys.ubbcluj.ro/alumni.htm
- https://www.bcucluj.ro/
- http://cncsis.gov.ro/

Meeting/discussions with doctoral students in the doctoral study domain under review

The meeting/discussions with doctoral students in the doctoral study domain under review was on-line and took place on 03/11/2021. At the meeting participated 5 students from DS Physics, belonging to different years (stages) of the PhD program.

Students were generally positive and stated that PhD Supervisor were always supportive and accessible, that they have their own allocated space and easy access to all available research resources. Students also highly appreciated the involvement of the Guidance Committee as well as their activity. It was certified that an interview was carried as a standard procedure of accessing the PhD Program. In general, it can be stated that the climate is very good, and students are very satisfied with the activity of DS Physics.

However, some aspects that can be improved were also identified, such as ease of access of students to anti-plagiarism software at all levels of PhD Thesis development (not only at the end) or increasing (if possible) the amount of the Doctoral Scholarship in order to prevent students from being forced to look for another job and, therefore, possibly affecting their performance during the completion of the doctoral thesis. Furthermore, this reviewer considers that DS Physics should further encourage its students to participate in mobilities abroad as well as in teaching activities (when possible). Another important aspect that can be improved is the complete digitalization of the bureaucratic process of PhD thesis submission and defense.

Meeting/Discussions with the graduates of the doctoral study domain under review

Meeting/Discussions with the graduates of the doctoral study domain under review was on-line and took place on 03/11/2021. At the meeting participated 5 former students from DS Physics at IOSUD UBB. Overall, they all seem satisfied with the quality of their development throughout the PhD, and they easily found a job. The doctoral graduates valued positively organization of DS Physics as well as the knowledge and skills acquired throughout their PhD Thesis development. Also, they highly evaluated the quality of the research facilities available at DS Physics as well as the exceptional expertise of the PhD Supervisors.

Meeting/Discussions with employers of the graduates in the doctoral study domain under review

The meeting/Discussions with employers of the graduates in the doctoral study domain under review was on-line and took place on 02/11/2021. At the meeting participated 5 representatives of employers of graduate students from DS Physics. Overall, they were all satisfied with the level of training of the graduates as well as their considerably high level of multidisciplinary approach. It was found that there is a very good collaboration between the companies and SD Physics that, in some cases, has led to the realization of joint doctoral theses in which the experimental part is performed in the external company while the theoretical part is performed within DS Physics.

Employers pointed out that there is a very well-developed socio-economic environment in the geographical area which allows almost immediate employment of SD Physics students and/or graduates. In this sense, almost all agreed that SD Physics should prepare more students as it is very difficult for some of them to find and hire qualified personnel.

They all agreed that both employers and doctoral school can benefit from constant cooperation that should start as soon as possible. As possible areas of improvement, they suggested introduction of entrepreneurship skills and a stronger development of the innovative attitude (initiation in innovation development, innovative spirit) of the students of DS Physics.

Overall, it seems that the level of cooperation can be further improved through the development of industrial doctorates or private-funded research contracts.

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 Director of the Doctoral School(s) in which the doctoral study domain under review is operating was on-line and took place on 02/11/2021. At the meeting participated the Director of DS Physics Prof. Simion Astilean and three other members of the CSD. During the meeting,

participants were informed on the results of the review of the Self-Assessment Report and several complementary documents were requested. All requested documents were either uploaded or sent by the evaluated institution within few days from request.

It was discussed the number of PhD students of the evaluated domain, the number of PhD supervisors and how the doctoral school is organized. DS Physics officials expressed their concern regarding the difficulty to attract students to DS Physics. At this moment, available places are covered but very rarely applications exceed number of open positions. It was also pointed out that the majority of PhD Students are working on inter- and trans-disciplinary topics, which is, definitely, a strong point of the evaluated institution. Also, it was pointed out that student benefit from a dedicated annual grant (10.000 RON) that they can use to support their research activity. School officials also stated that the implementation of complementary UBB research grants might result helpful to further support research activity within DS Physics. The evaluation team also inquired regarding the process of PhD Supervisors assessment (evaluation), answered as a two-way process: peer and student evaluation.

Meeting/Discussions with the doctoral advisors in the doctoral study domain under review

The meeting/discussions with the doctoral advisors in the doctoral study domain under review was on-line and took place on 02/11/2021. At the meeting participated a total of 7 PhD Advisors. During the meeting, participants were informed on the results of the review of the Self-Assessment Report as well as the conclusions extracted after the meeting with DS Physics officials.

Generally, it was discussed the specific research field of the participants, the number of PhD students that they supervise currently, their actual position within the DSs and their strategy to attract possible PhD candidates. The issue of funding within SD was also revisited as well as the different mechanisms through which students benefit from different resources. Other administrative and legislative issues were also discussed.

The evaluation panel addressed questions regarding the average time of development of a PhD Thesis (answered as typically 3-4 years) and the average number of ISI publication of a PhD Student (answered as minimum 3 and can go as up as 15; there is a minimum requirement of 2 ISI Papers). To a large extent there is good collaboration between the Guidance committees and the PhD coordinator. Guidance Committee is carefully selected to cover expertise within the area of interest of the PhD Thesis. There is a transfer of attributions from the PhD Supervisor to the Guidance committee for a better management of the PhD Thesis development.

It was also discussed the strategy in place to attract international students, which, although exists, unfortunately it is not very effective. It seems that there is demand from international students as a result of posting of PhD Positions opportunities on Euraxess and other similar platforms. Unfortunately, not all potential candidates can apply due to lack of national funding for foreign students. There are also international conferences organized at DS Physics level and staff form DS Physics are also involved in International (EU) COST type actions, etc.

It was certified that PhD Students are encouraged to attend lectures at international conferences, as well as research training and internships. DS Physics actively participates in a conference that is organized within the university consortium of which UBB is part. Also, recently, a PhD Student only conference was organized in Spain (together with other several universities from Spain and abroad) in which 22 PhD Students participated.

Participants were also asked regarding the admission process, and it was answered that there is a written exam and afterwards an interview (often in English). The results are decided by an admission committee, which is not decided by the PhD supervisor.

All question were adequately answered, and it seems that the doctoral domain works under the guidelines of a first-class institution, with considerable research potential as well as considerable research output. PhD supervisors are supportive with their students, and this is clearly reflected on the quality and quantity of the research output of the evaluated institution.

The Evaluation Visit

The evaluation visit took place on 04/11/2021. The coordinator of the evaluation panel (Prof. Liviu Leontie) visited the facilities available at UBB DS Physics. The visit included UBB headquarters, where the Faculty of Physics and the DS Physics UBB operate. The evaluated institution provided photos and additional resources to document the instruments available at their research and teaching facilities.

The visited sites were:
- Lecture halls and auditorium;
- Library;
- Offices for PhD students;
- Laboratories supporting research in DS Physics UBB, among which we mention:
    - National Center for Magnetic Resonance;
    - RAMAN - SPM Laboratory;
    - Laboratory for Thermal and Structural Sample Preparation and Characterization;
    - Laboratory for the synthesis of magnetic thin films;
    - Laboratory for magnetic measurements;
    - NANOSIM Laboratory;
    - Institute for Interdisciplinary Research in Bio-Nanosciences;

Research facilities are in good standing, and they fulfill all recent requirements in terms of space distribution, allocated spaces, available complementary services, etc. In terms of research infrastructure, facilities are well equipped with state-of-the art equipment that can clearly help and motivate students to properly engage in their research activities.

III. Analysis of ARACIS's performance indicators

Domain A. INSTITUTIONAL CAPACITY

Following the analysis of the Self-Assessment Report, the online meetings and the visit to the Doctoral School of Physics of the Babes-Bolyai University of Cluj-Napoca (UBB) Romania it was concluded that the UBB demonstrates the institutional capacity to carry out in excellent conditions the activities of doctoral studies in physics, successfully meeting the standards required for this activity.

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

The DS Physics at UBB has implemented the effective operating mechanisms set out in the specific legislation on the organisation of doctoral studies, the National Education Law no. 1/2011 and the Code of Doctoral Studies, HG 681/2011.

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:*

(a) the internal regulations of the Doctoral School;

(b) the Methodology for conducting elections for the position of director of the Council of doctoral school (CSD), as well as elections by the students of their representative in CSD and the evidence of their conduct;

c) the Methodologies for organizing and conducting doctoral studies (for the admission of doctoral students, for the completion of doctoral studies);

d) the existence of mechanisms for recognizing the status of a Doctoral advisor and the equivalence of the doctoral degree obtained abroad;

e) functional management structures (Council of the doctoral school), giving as well proof of the regularity of meetings;

f) the contract for doctoral studies;

g) internal procedures for the analysis and approval of proposals regarding the training for doctoral study programs based on advanced academic studies.

- 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

Babeș-Bolyai University (UBB) operates under the academic autonomy concept, which is defined as specific means of self-management in accordance with the legal framework provided by the Romanian Constitution and by National Education Law No. 1/2011 and other laws such as Government Emergency

Ordinance No. 75/2005 regarding the education quality assurance, approved by Law No. 87/2006 with subsequent amendments and in line with internal regulations and decisions

The regulations of DS Physics are easily available online. Regulations are constantly updated at both UBB and DS levels in accordance with the current legislative orders and laws. Evaluated institution presented the methodology for conducting elections for the position of director of the Council of doctoral school (CSD), as well as elections by the students of their representative in CSD and the evidence of their conduct. Also, the methodologies for organizing and conducting doctoral studies (for the admission of doctoral students, for the completion of doctoral studies) were submitted.

Similarly, it was proven the existence of mechanisms for recognizing the status of a Doctoral advisor and the equivalence of the doctoral degree obtained abroad; the functional management structures (Council of the doctoral school), with proof of the regularity of meetings and the contract for doctoral studies. Finally, the internal procedures for the analysis and approval of proposals regarding the training for doctoral study programs based on advanced academic studies were also submitted.

It is considered that the evaluated institution provided all required specific regulations as well as proof of their application at the level of the Doctoral School of the respective university doctoral study domain. When needed, additional documents were provided. Based on the analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself, this performance indicator is considered to be fulfilled

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 evaluated institution submitted for review regulation of DS Physics. The submitted documents included 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. Based on the analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself, this performance indicator is fulfilled.

The indicator is fulfilled.

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

According to the Self-Assessment Report and the online and on-site visit, the committee found that the DS Physics UBB has the necessary logistical resources to fulfil the mission of the PhD studies in Physics.

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.*

The full record of the doctoral students and of their entire activity during PhD thesis development is maintained by the UBB IOSUD (Institute for Doctoral Studies) on both paper support and a computerized

PhD Student management program (IT system). DS Secretariat has access to the documents from Academic Info, an internal electronic platform implemented in UBB since 2007. Additionally, specific information is collected electronically (xls files with the amounts of the doctoral grant, record of the mentoring committee, curricula,etc.). The collaboration between IOSUD and DS Physics allows the information exchange between these entities. The Secretariat of the DS keeps also other documents such as a copy of the students records, protocols for participating at the disciplines from curricula, etc.

Recommendations: The evaluated institution is encouraged to further develop and improve their PhD Student IT management program in order to allow continuous and efficient monitoring of PhD Students and also to achieve almost complete digitalization of the bureaucratic flow within IOSUD and subsequently DS Physics.

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-UBB, and subsequently DS Physics, uses iThenticate software as a support tool for academic writing instruction and for checking the similarity percentage. Also, since 2019, it was also incorporated the use of the Turnitin software. These two similarity check software are considered as reference within the filed, and therefore, the evaluated institutions fulfills all requirements for this indicator.

With the help of the software, all doctoral theses are analysed in accordance with internal procedures before their defense in front of the Guidance committee and before their public defense. The methodology described above allows to discern whether the similarity is purely mechanical (broad titles, names of institutions, names of documents and normative acts, formulations that have entered into common usage in the language of a given discipline, etc.) and is not a fraudulent assumption of ideas, i.e. it is not plagiarism. However, there is no critical percentage of similarity established neither at IOSUD nor DS Physics.

Recommendations: The evaluated instituiton is encouraged to further promote the use of anti-plagiarism software within their PhD Students at all levels of the PhD Thesis development.

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.

According to the Self-Assessment Report and the online and on-site visit, the committee found that the financial resources available at DS Physics UBB are used optimally, and that income from doctoral studies is complemented with additional funding, such as UBB micro-grants, research projects led by the UBB or DS Physics partners.

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.*

Following the document review and analysis, DS Physics PhD Supervisors were directors or team leaders of a total of 39 competitively research grants for the evaluated period (2016-2020). The grants address relevant themes for the respective domain and, as a rule, are engaging doctoral students, as 30 PhD students were involved in the development of these research grants.

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%.*

For the evaluated period, the percentage of doctoral students 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 32 out of 133 total enrolled students. The percentage is equal to 24.06%, therefore fulfilling this Performance Indicator for the evaluated period.

Regarding the percentage of doctoral students active at the time of the evaluation, from what it can be extracted from Annex 1.3.2, a total of 19 students out 41 enrolled students during 2020/2021 benefit of additional funding. The percentage is equal to 46.03%, therefore fulfilling this Performance Indicator.

Recommendations: The evaluated institution should maintain this positive momentum and attract additional funding sources besides government funding and further increase this ratio within next five years.

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.).*

[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.

During the evaluation activities it was clear that DS Physics UBB is pursuing this goal. Any PhD Student who carries out his/hers activity within DS Physics can benefit annually, during the preparation period of the PhD Thesis, from financial support for carrying out training activities in the amount of 10.000 RON, independent of other sources of funding for access by doctoral students to institutional resources for professional training.

According to the information provided by the evaluated institution, 213.660 RON out of a total of 1.199.000 RON were allocated for this specific purposes. Therefore, the percentage of this specific allocation is 17.82%. It is important to mention that these above mentioned amounts do not include other type of financing, such as APCs, which will further increase this percentage.

The indicator is fulfilled.

Criterion A.2. Research infrastructure

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

The research facilities and the equipment available at the DS Physics at UBB are adequate for scientific research activities in the field of physics and contribute successfully to the achievement of its mission and objectives. The research infrastructure and the offer of research services are presented to the public through the ERRIS platform (https://eeris.eu/ERIF-2000-000R-0855).

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.*

Research facilities available for PhD Students at Doctoral Domain Physics are truly remarkable, as they fulfill all recent requirements in terms of space distribution, allocated spaces, available complementary services, etc. In terms of research infrastructure, facilities are extremely well equipped with state-of-the art equipment that can clearly help and motivate students to properly engage in their research activities.

PhD Students have access to „Biblioteca Centrală Universitară "Lucian Blaga" Cluj-Napoca" - UBB Central Library, The library supports the entire academic education system in Cluj and it is remarkable through the variety of its collections and through its professional and high-toned services provided to its users. Today, its collections contain a total of 4.000.000 volumes, out of which 497.000 publications are periodicals. An important documentation resource is the collection of traditional digitized catalogues, as well as the digital library. In order to support the education process, the library offers access to its collections of the most prestigious scientific international databases. Together with the faculty libraries and the libraries of the cultural centres, the central building the C.U.L offers its users 2.177 seats in over 60 reading rooms..

DS Physics benefits of 23 research laboratories with specific equipment. The available research infrastructure and the offer of research services are presented to the public through the ERRIS platform (https://eeris.eu/ERIF-2000-000R-0855). After analyzing the findings from the assessed institution's documents and the evaluation visit itself, it was found the DS Physics students have access to several research laboratories where they can carry out their specific research activity in very good conditions:

- National Center for Magnetic Resonance;
- RAMAN - SPM Laboratory;
- Laboratory for Thermal and Structural Sample Preparation and Characterization;
- Laboratory for the synthesis of magnetic thin films;
- Laboratory for magnetic measurements;
- NANOSIM Laboratory;
- Institute for Interdisciplinary Research in Bio-Nanosciences;

A great part of the research facilities and/or research equipment was either built or acquired in the last 5 years, which proves the continuous effort of the evaluated institution to provide its students with the best resources for the proper development of their PhD Thesis.

The indicator is fulfilled.

Criterion A.3. Quality of Human Resources

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

The DS Physics at UBB integrates only one doctoral field (Physics). The teaching staff is of exceptional quality, as proven by the CNATDCU's far exceeded.

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.*

All PhD Supervisors fully meet the CNATDCU 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.

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.*

The Doctoral School of Physics operates with only one doctoral field of study, the field of Physics, with a total of 23 PhD Supervisors, of whom 20 are UBB tenured Professors (2 of them UBB retirees) and 3 of them are affiliated to DS Physics but have a full-time contract with another Entity.

Therefore, the percentage of all doctoral advisors that have a full-time employment contract for an indefinite period with the IOSUD is 18/23=78.26%. Therefore, this indicator is fulfilled.

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.*

On the institutional website (http://phys.ubbcluj.ro/departamente/sd/doc/plan_inv2021_2022_site.pdf) are listed all the subjects included in the education program based on advanced higher education studies pertaining to the doctoral domain together with the teaching staff in charge of each subject. All teaching staff that participates in the training program are either Full, Associate Professors and/or CSI with proved expertise in the field of the study subjects they teach.

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 programs[3] does not exceed 20%.*

Within DS Physics, during the analyzed period, there were no doctoral supervisors who coordinate more than 8 doctoral students simultaneously.

The indicator is fulfilled.

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

After reviewing the documents submitted, the lists of publications and the CVs of the DS Physics UBB members, it was found that the overwhelming majority of PhD supervisors have an internationally recognised scientific activity. This finding is supported by publications in high-impact journals as well as by the number of citations that their publications received in the past years.

Several 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

[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.

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.

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 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.*

For the evaluated period, all PhD Supervisors at DS Physics UBB 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. Also, several 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.

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.*

Based on the analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself, it was ascertained that more than 50% of the PhD supervisors from DS Physics have been scientifically active in the last 5 years, achieving at least 25% of the score requested by the minimal CNATDCU standards in force at the time of the evaluation.

The indicator is fulfilled.

Domain B. EDUCATIONAL EFFECTIVENESS

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

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.

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 provided documents, 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, was as follows: 0.08 in 2016/2017, 0.16 in 2017/2018, 0 in 2018/2019, 0.11 in 2019/2020 and 0.21 in 2020/2021. The average over the evaluated period is 0.11.

Although for the entire evaluated period the average is 0.11, it must be highlighted the positive momentum of DS Physics in attracting students from outside UBB (with a ratio of 0.21 in the last year). However, here a possible threat is identified, as the number or candidates from other higher education institutions tends to fluctuate, with a one-year situation when the number of masters' programs graduates of other higher education institutions was 0. The evaluated institution should carefully monitor the evolution if this indicator.

On the other hand, the ratio 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 was 1 for the entire evaluation period (with one exception: 2020/2021 - 1.13).

Recommendations: The evaluated institution is encouraged to develop functional strategies to attract graduates of masters' programs of other higher education institutions, national or foreign.

The indicator is partially fulfilled.

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

The admissions methodology ensures a good selection of students, and there is a concern for selecting the best candidates, which leads to a low rate of students being expelled.

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.*

Based on the analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself, it was ascertained that admission to doctoral study programs is based on selection

criteria including: previous academic, research and professional performance, their interest for scientific research, publications in the domain and a proposal for a research subject. Compulsory interviewing with the candidate is also part of the admission procedure.

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 admission[4] does not exceed 30%.*

According to the documents provided, the expelling rate, including renouncement / dropping out of doctoral students 3 years after admission over the last 5 years, the ratios are 6.67%, 8.33%, 9.09%, =% and 0% yearly for 2015-2019 period. The avergae ratio is 4.81%. Therefore, this performance indicator is fulfilled.

The indicator is fulfilled.

Criterion B.2. The content of doctoral programs

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.

Following discussions with students, graduates and their employers, a high level of satisfaction with the professional skills and abilities acquired during doctoral studies (courses, scientific research, participation in conferences, etc.) by the students enrolled at DS Physics was found.

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.*

The training program based on advanced university studies at DS Physics includes a total of 6 disciplines, of which 4 are related to the scientific research training of doctoral students, one is related with General research methods and methodology of scientific writing and lastly, a dedicated discipline to Ethics and academic integrity.

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.*

[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.

The curriculum related to the doctoral program in Physics, includes the discipline "Ethics and academic integrity", which is dedicated to ethics in scientific research, integrity and intellectual property with well-defined topics on these subjects.

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 activities*[5]*.*

According to the analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself, the evaluated institution has proven to have 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 activities

The indicator is fulfilled.

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.*

For the entire duration of their doctoral training, PhD Students in the evaluated domain receive counselling/guidance from an Guidance committee. The Guidance committees are chosen so that, through the expertise of the members of the committee, they can competently guide the research activity of the PhD student. The research activity of the doctoral students is periodically evaluated by the mentoring committee as follows: the doctoral student presents at the end of the 1st academic year his research project that contains the topic and the structure of the doctoral thesis, and furthermore, they presents at the end of the 2nd and 3rd academic years two yearly reports and a final one in order to obtain the agreement for the defense of their doctoral thesis.

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.*

For the Doctoral Domain evaluated, the ratio between the number of doctoral students and the number of teaching staff/researchers providing doctoral guidance (PhD Supervisors + Members of the guidance Committees) is 41/42=0.97.

[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.

The indicator is fulfilled.

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

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

The analysis carried out focused on the publications and participations in conferences of PhD students and illustrates a high level of dissemination of the scientific results obtained.

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.*

The evaluated institution provided a list of significant works (a total of 188 articles) corresponding to the 30 PhD students who have obtained the title of doctor in the last 5 years (evaluated period) as well as one representative article per student. The average of publications/PhD Student was 6.26 items. This reviewer randomly selected 5 papers and all of them contained significant original contributions in the respective domain. In fact, after briefly consulting the list of provided contributions, I was pleasantly surprised by the quality and relevance of almost all contributions. This clearly reflects the high-quality of the research carried out at the evaluated institution.

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, for the Doctoral Domain evaluated, 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) was 4.76 (143/30), exceeding the recommended threshold.

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.

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.*

For PhD Theses coordinated by the same doctoral thesis advisor, the number of doctoral theses allocated to one specialist coming from a higher education institution, other than the evaluated IOSUD did not exceed two (2) in a year in any case.

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 findings from the assessed institution's documents, 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 past five years and in the same doctoral study domain did not exceed 0.3 in any case.

The indicator is fulfilled.

Domain C. QUALITY MANAGEMENT

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

From the analysis of the available documents as well as a result of online meetings and and on-site visits (including meetings with students and graduates) it can be concluded that the institutional framework for quality assurance is in place and policies and procedures for internal quality assurance are in practice. DS Physics UBB doctoral students have secured access to learning resources and have unrestricted access to the resources necessary to conduct their doctoral studies. There is also a coherent and successful strategy on sustaining international collaborations and increasing the internationalisation of doctoral studies.

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.

From the analysis of the available documents as well as a result of online meetings and and on-site visits it was noted the existence of the institutional framework for quality assurance and the application of policies and procedures for internal quality assurance.

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.

The quality of the doctoral study programmes and the performances of the doctoral supervisors are evaluated at the university level according to the existent procedures at the Institute of Doctoral Studies. DS Physics uses all feedback mechanisms elaborated by the Institute of Doctoral Studies in order to identify the satisfaction level of the doctoral students with respect to the doctoral programme.

In order to ensure the quality of the activities carried out within the doctoral schools, IOSUD-UBB has organized periodically internal evaluations of the doctoral schools. The internal evaluation reports followed the evolution of the logistic infrastructure necessary for the research activity, the scientific activity of the doctoral supervisors, respectively the evolution of the procedures and norms based on which the activities within the doctoral schools are carried out. The scientific activity of PhD Supervisors is monitored periodically, on a yearly basis. PhD students work in laboratories and research centres whose infrastructureand logistics are managed at the level of specialized faculties.

The regulations and procedures of DS Physics UBB are publicly available at http://phys.ubbcluj.ro/departamente/sd.htm. The DS is evaluated yearly based on specified internal regulation. The scientific activity of the PhD Students is also monitored periodically. Also, PhD students are encouraged to fulfill assessment reports regarding different aspects of DS Physics organization, including the training program based on advanced university studies as well as different social and academic services (including for participation at different events, publishing papers etc.).

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.*

The evaluated institution has tools and mechanisms in place to identify the needs and satisfaction of students through specific questionnaires. These questionnaires allow for a permanent analysis and feedback mechanism for students on different aspects of the educational act carried out within the DS Physics.

The evaluated institution provided a report (at UBB level - which also included DS) corresponding to the year 2019, where answers from student questionnaires were analyzed and recommendations were

issued. However, there was not clear evidence that an action plan was drafted and implemented based on answers of the aforementioned questionnaires at DS Physics level.

Recommendation: In order to create a real climate of quality culture, the institution is encouraged to promote the purpose and benefits of quality assurance procedures among both staff and students. The student satisfaction questionnaires should be filled at least once a year by the majority of PhD Students. Consequently, the evaluation results should be considered for strategic decision-making. Both the results as well as the consequences are highly recommended to be made publicly available (as for example, on the institutional website).

The indicator is fulfilled.

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

From the analysis of the available documents as well as a result of online meetings and and on-site visits (including meetings with students and graduates) it can be concluded that PhD students were provided access to learning resources. The evaluation committee finds that the DS Physics UBB provides doctoral students with unrestricted access to the resources needed to carry out their doctoral studies.

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

From the analysis of the available documents as well as a result of online meetings and and on-site visits it was noted that the evaluated institution ensures information and access to it for doctoral students, potential candidates, all information of public interest is available for electronic access.

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.

According to the description of the facts, the findings from the assessed institution's documents, the consulted websites and the evaluation visit itself it can be concluded that both IOSUD and DS Physics

UBB publishes, in compliance with the general regulations on data protection, on several websites related with the Doctoral domain evaluated:

https://doctorat.ubbcluj.ro/ro/
http://phys.ubbcluj.ro/departamente/sd.htm

relevant information on:
- the Doctoral School regulation;
- the admission regulation;
- the doctoral studies contract;
- the study completion regulation including the procedure for the public presentation of the thesis;
- the content of training program based on advanced academic studies;
- the academic and scientific profile, thematic areas/research themes of the Doctoral advisors within the domain, as well as their institutional contact data;
- the list of doctoral students within the domain with necessary information (year of registration; advisor);
- information on the standards for developing the doctoral thesis;
- 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.

DS Physics publishes on its website relevant information regarding the organization and functioning of doctoral studies within the university. Thus, on the site can be found the Institutional Regulation on the organization and functioning of doctoral studies as well as a whole series of concrete information on enrolment in doctoral studies, conducting doctoral studies/research, and the public defence of the doctoral thesis. The other (specific) doctoral regulations, in particular the regulations and procedures for the public defence of the doctoral thesis, are also presented in detail on the website. The particular regulations of doctoral schools are also published, information on admissions to doctoral studies (number of places and their types, admission methodologies, admission schedule, topics proposed by doctoral supervisors, etc.), content of study programmes, information on conferences and trainings organized by the university, etc.

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.

The evaluated institution provides doctoral students with unrestricted access to the resources needed for conducting doctoral studies (scientific documentation, help in editing scientific papers and theses, free access to research laboratories, dissemination).

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.*

All PhD Students enrolled at DS Physics benefit of IP-based online access to scientific electronic resources (databases/platforms of scientific journals with full text and bibliographic and bibliometric databases) to support research, education, innovation and stimulate scientific production.

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.*

All PhD Students enrolled at DS Physics have the ability to use the iThenticate software as a support tool for academic writing instruction and for checking the similarity percentage. Also, since 2019, it was also incorporated the use of the Turnitin software. These two similarity check software are considered as reference within the filed, and therefore, the evaluated institutions fulfills all requirements for this indicator.

Recommendations: the evaluated instituiton is encouraged to further promote the use of anti-plagiarism software within their PhD Students at all levels of PhD Thesis development.

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 provided information and the conclusions drawn after the evaluation visit, it was observed that PhD Students have access to the different research laboratories as well as other facilities, depending on the specific field. It is noteworthy that most of the PhD Thesis under development at DS Physics are inter- or trans-disciplinary.

The indicator is fulfilled.

Criterion C.3. Internationalization

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

According to the description of the facts, the findings from the assessed institution's documents, the consulted websites and the evaluation visit itself it was observed a coherent and successful strategy for sustaining DS Physics UBB international collaborations and increasing the internationalization of the doctoral studies.

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.*

The ERASMUS program coordinated by the International Cooperation Center of UBB is another possibility to supplement the vocational training of the doctoral students. The Erasmus program is offering scholarships to the doctoral students. The selection sessions are posted on the faculty website: http://www.phys.ubbcluj.ro/erasmus/erasmus.htm. In the framework of the ERASMUS+ programme, several incoming staff have visited DS Physics and delivered courses for students.

According to the documents provided by the institution regarding the participation in international conferences of doctoral students who completed their thesis during the evaluated period, it results that a number of 20 doctoral students completed a training course abroad or other mobility forms such as attending international scientific conferences during the evaluated period. This represents a percentage of 66.67% of the total number of doctoral students who completed their thesis in this period. If only the number of doctoral students participating at mobility periods abroad are considered, the percentage drops to 26.67 (8 out 30), exceeding the 20% target at the level of the European Higher Education Area.

Although it seems that DS Physics drafts and applies policies and measures aiming at increasing the number of doctoral students participating at mobility periods abroad, it is still room for improvement regarding PhD Students' research training and internships in external institutions.

Recommendations: Increase the number of students' research training and internships in external institutions (mobility period abroad). It is highly recommended for each student to perform a research internship of at least three months outside the evaluated institution during his/hers PhD Thesis development.

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 analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself, it was clear that within the evaluated Doctoral Domain - Physics is an international opening related to the co-opting of foreign students and for the organization of doctorates in international co-tutelage. In the period 2016-2020, 20 out of the 30 doctoral theses submitted were written in English. In the same period, there were 10 international experts members in the Doctoral Committees and 18 international guests delivered scientific seminars with different occasions. For the evaluated period, there were 2 PhD Thesis developed in joint supervision. The doctoral students had the possibility to supplement their proffesional background by taking part at different scientific events, summer schools, conferences of the doctoral students, seminars, workshops, etc. Thus, in the 2016-2020 period, the Faculty of Pysiscs organized the 11st International Conference on Physics of Advanced Materials-ICPAM 2016 as well as several workshops. Starting with 2018, the Universitaria consortium organized every year a national conference of the doctoral students from the Physics field. In 2018 I twas organized for the first time the Worksop of the physics doctoral students at Timișoara (https://timconference.uvt.ro/),and later on such an event was organized by all other universities from the consortium.

Recommendations: The evaluated institution is encouraged to increase the percentage of foreign (international) participants within PhD Committees. As a possible target, a recommendation would be that 50% of PhD Committees should benefit from the presence of an international reviewer.
The evaluated institution should increase its collaborative effort into realizing a higher number of doctorates in co-tutelage with both national and international institutions.

The indicator is 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 analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself, it was clear that within the evaluated Doctoral Domain - Physics is an international opening related to the co-opting of foreign students and for the organization of doctorates in international co-tutelage. In the period 2016-2020, 20 out of the 30 doctoral thesis submitted were written in English. In the same period, there were 10 international experts members in the Doctoral Committees.

Recommendations:

- *The evaluated institution is encouraged to increase the percentage of international experts in guidance committees or doctoral committees as close as possibly to 50% within next 5 years.*
- *The evaluated institution is encouraged to create a complete English version of its website and to offer, if applicable, teaching alternatives and guidance in English.*

The indicator is fulfilled.

IV. SWOT Analysis

Strengths:	**Weaknesses:**
- Within DS Physics UBB a high performance scientific research activity is carried out, validated by a large number of WoS rated articles; - Low ratio of PhD Students / PhD Supervisor; - Well equipped and modern research facilities; - A functional institutional capacity proven both by the quality of the teaching and research staff and by the administrative structure, which has a constant concern in supporting the training process of PhD students. - The competences formed are successfully confirmed by the low dropout rate and by the fact that all graduates work in fields related to the scientific training obtained in the doctoral school. - The high degree of dissemination and valorisation of the scientific results obtained by the PhD students (published articles, participation in conferences), most of them as main authors. - Doctoral students benefit from IOSUD financial resources to cover expenses related to their professional training (participation in international conferences, publication of articles, etc.); - Positive feedback from students, graduates and employers; - Almost all PhD students work on interdisciplinary and trans-disciplinary topics. - High number of research grants accessed by DS Physics staff; - High number of invited/guest foreign professors as members of the doctoral committees and to deliver courses and seminars; - High number of the doctoral thesis submitted in English;	- Reduced number of applicants for admission at Doctoral studies. - Relatively small number of the international doctoral students; - Relatively small number of the joint supervision doctoral thesis; - The innovative and applicative part of the scientific research is not fully encouraged (aas for example, by registering national and/or interantional patents). - Funding for PhD Students from other external sources.
Opportunities:	**Threats:**
- Attract possible PhD Supervisors from affiliated Research Institutes; - Excellent links with industry and research institutes (potential employers and partners in research projects); - There is a very well-developed socio-economic environment in the Geographical area which	- Unpredictability of scientific research funding at national level. - Decrease in the number of applicants due to the introduction of doctoral studies in Physics at other Universities and/or Institutes of the Romanian Academy in the same city and/or geographic area;

allows almost immediate employment of SD Physics students. - The development of industrial doctorate could be an excellent opportunity to strenghten links with industrial partners as well as to attract more student to DS. Other possibilies might arise by attracting industrial partners into private-funded research labs. - Development of new international partnerships to increase the number of students participating in mobilities; - Increasing the number of co-tutelage doctorate might be a way of attracting more students towards Physics Doctoral Domain. - Access to additional sources of funding (DAAD grants, Marie Curie, etc.) to support the research activities of doctoral students; - Implement a feedback mechanism from graduates and their employers to improve the content of the advanced degree-based training programme; - Development of new lines of research in the Medical Physics field;	- Decrease in the number of applicants for admission due to the decreasing interest in the field and/or the low visibility of IOSUD/ DS Physics. The evaluated institution should be more proactive on identifying and recruiting possible PhD candidates and to ensure that they have available, in an accessible and prompt manner, as much information as possible on all relevant aspects of the institution; - Lack of financial competitiveness of PhD Scholarships compared to the salary that a MSc graduate can earn in a private company;

V. Overview of judgments awarded and of the recommendations

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
1.	**PI**	**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: a) the internal regulations of the Doctoral School; b) the Methodology for conducting elections for the position of director of the Council of	**Fulfilled**	

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		doctoral school (CSD), as well as elections by the students of their representative in CSD and the evidence of their conduct; c) the Methodologies for organizing and conducting doctoral studies (for the admission of doctoral students, for the completion of doctoral studies); d) the existence of mechanisms for recognizing the status of a Doctoral advisor and the equivalence of the doctoral degree obtained abroad; e) functional management structures (Council of the doctoral school), giving as well proof of the regularity of meetings; f) the contract for doctoral studies; g) internal procedures for the analysis and approval of proposals regarding the training for doctoral study programs based on advanced academic studies.		
2.	**PI**	**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.	**Fulfilled**	
3.	**PI**	**A.1.2.1.** The existence and effectiveness of an appropriate IT system to keep track of doctoral students and their academic background.	**Fulfilled**	The evaluated institution is encouraged to further develop and improve their PhD Student IT management program in order to allow continuous and efficient monitoring of PhD Students and also to achieve almost complete digitalization of the bureaucratic flow within IOSUD and subsequently DS Physics.
4.	**PI**	**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.	**Fulfilled**	The evaluated instituiton is encouraged to further promote the use of anti-plagiarism software within their PhD Students at all levels of the PhD Thesis development.
5.	**IP**	**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	**Fulfilled**	

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		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.		
6.	**PI ***	**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%.	**Fulfilled**	The evaluated institution should maintain this positive momentum and attract additional funding sources besides government funding and further increase this ratio within next five years.
7.	**PI ***	**A.1.3.3.** 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.).	**Fulfilled**	
8.	**CPI**	**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	**Fulfilled**	
9.	**CPI**	**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	**Fulfilled**	

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		force at the time when the evaluation is carried out, which standards are required and mandatory for obtaining the enabling certification.		
10.	**PI ***	**A.3.1.2.** At least 50% of all doctoral advisors have a full-time employment contract for an indefinite period with the IOSUD.	**Fulfilled**	
11.	**PI**	**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.	**Fulfilled**	
12.	**PI ***	**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 programs does not exceed 20%.	**Fulfilled**	
13.	**CPI**	**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 prove	**Fulfilled**	

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		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.		
14.	**PI ***	**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	**Fulfilled**	
15.	**PI ***	**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.	**Partially Fulfilled**	The evaluated institution is encouraged to develop functional strategies to attract graduates of masters' programs of other higher education institutions, national or foreign.
16.	**PI ***	**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.	**Fulfilled**	
17.	**PI**	**B.1.2.2.** The expelling rate, including renouncement / dropping out of doctoral students 3, respectively 4, years after admission does not exceed 30%.	**Fulfilled**	
18.	**PI**	**B.2.1.1.** The training program based on advanced academic studies includes at least	**Fulfilled**	

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		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.		
19.	**PI**	**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.	**Fulfilled**	
20.	**PI**	**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 activities.	**Fulfilled**	
21.	**PI**	**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.	**Fulfilled**	
22.	**CPI**	**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.	**Fulfilled**	
23.	**CPI**	**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	**Fulfilled**	
24.	**PI ***	**B.3.1.2.** The ratio between the number of presentations of doctoral students who completed their doctoral studies within the	**Fulfilled**	

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		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.		
25.	**PI ***	**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.	**Fulfilled**	
26.	**PI ***	**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.	**Fulfilled**	
27.	**PI**	**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.	**Fulfilled**	

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
28.	**PI ***	**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.	**Fulfilled**	In order to create a real climate of quality culture, the institution is encouraged to promote the purpose and benefits of quality assurance procedures among both staff and students. The student satisfaction questionnaires should be filled at least once a year by the majority of PhD Students. Consequently, the evaluation results should be considered for strategic decision-making. Both the results as well as the consequences are highly recommended to be made publicly available (as for example, on the institutional website).
29.	**CPI**	**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.	**Fulfilled**	
30.	**PI**	**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.	**Fulfilled**	The evaluated instituiton is encouraged to further promote the use of anti-plagiarism software within their PhD Students at all levels of PhD Thesis development.

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
31.	**PI**	**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.	**Fulfilled**	
32.	**PI**	**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.	**Fulfilled**	
33.	**PI ***	**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.	**Fulfilled**	Increase the number of students' research training and internships in external institutions (mobility period abroad). It is highly recommended for each student to perform a research internship of at least three months outside the evaluated institution during his/hers PhD Thesis development.
34.	**PI**	**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.	**Fulfilled**	The evaluated institution is encouraged to further increase the percentage of foreign (international) participants within PhD Committees. As a possible target, a recommendation would be that 50% of PhD Committees should benefit from the presence of an international reviewer.
35.	**PI**	**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.).	**Fulfilled**	The evaluated institution is encouraged to increase the percentage of international experts in guidance committees or doctoral committees as close as possibly to 50% within next 5 years. The evaluated institution is encouraged to create a complete English version of its website and to offer, if applicable, teaching alternatives and guidance in English.

VI. Conclusions and general recommendations

The Doctoral Study Domain Physics within IOSUD Babeș-Bolyai University is of remarkable quality. DS Physics has a functional institutional capacity proven both by the quality of the teaching and research staff and by the administrative structure, which has a constant concern in supporting the training process of PhD students. The competences formed are successfully confirmed by the low dropout rate and by the fact that all graduates work in fields related to the scientific training obtained in the doctoral school.

DS Physics benefits of highly qualified PhD Supervisors, with significantly number of publication and international visibility. At DS Physics, a high-performance scientific research activity is carried out, validated by the high degree of dissemination and valorization of the scientific results obtained by the PhD students (published articles, participation in conferences), most of them as main authors. It also noteworthy that almost all PhD students work on interdisciplinary and trans-disciplinary topics and benefit from IOSUD financial resources to cover expenses related to their professional training (participation in international conferences, publication of articles, etc.). It was also observed a high degree of internationalization, as proven by the high number of invited/guest foreign professors as members of the doctoral committees and/or to deliver courses and seminars and the high number of the doctoral thesis submitted in English.

Some weaknesses were also identified, such as the reduced number of applicants for admission at Doctoral studies, the relatively small number of the international doctoral students and joint co-supervision doctoral thesis or the funding for PhD Students from other external sources.

Possible threats have also been identified, such as the unpredictability of scientific research funding at national level, the decrease in the number of applicants due to the introduction of doctoral studies in Physics at other Universities and/or Institutes of the Romanian Academy in the same city and/or geographic area or the decrease in the number of applicants for admission due to the decreasing interest in the field and/or the low visibility of IOSUD/ DS Physics. In this sense, the evaluated institution should be more proactive on identifying and recruiting possible PhD candidates and to ensure that they have available, in an accessible and prompt manner, as much information as possible on all relevant aspects of the institution. Also, one concerning issue is the lack of financial competitiveness of PhD Scholarships compared to the salary that a MSc graduate can earn in a private company, therefore diminishing interest on PhD studies.

Nevertheless, DS Physics at UBB can benefit in the future of their excellent links with industry and research institutes (potential employers and partners in research projects) and the very well-developed socio-economic environment in the Geographical area which allows almost immediate employment of SD Physics students. In this sense, the development of industrial doctorate could be an excellent opportunity to strengthen links with industrial partners as well as to attract more students to DS. Other possibilities might arise by attracting industrial partners into private-funded research labs. DS Physics can also attract possible PhD Supervisors from affiliated Research Institutes and develop new lines of research in the Medical Physics field. International partnerships can increase the number of students participating in mobilities. Furthermore, the increase of the number of co-tutelage doctorate and access to additional sources of funding (DAAD grants, Marie Curie, etc.) to support the research activities

of doctoral student might be an effective way of attracting more students towards Physics Doctoral Domain at UBB.

From a formal quantitative point of view, all critical performance indicators have been qualified as met. Except for one performance indicator, indicator B.1.1.1., all other performance indicators were also rated as met. Indicator B.1.1.1, which is not critical, was rated partially met since, at the time of the assessment, according to provided documents, 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, was, in average over the evaluated period, 0.11. Although for the entire evaluated period the average is 0.11, it has to be highlighted the positive momentum of DS Physics in attracting students from outside UBB (with a ratio of 0.21 in the last year). However, here a possible threat is identified, as the number or candidates from other higher education institutions has a tendency to fluctuate, with a one-year situation when the number of masters' programs graduates of other higher education institutions was 0. The evaluated institution should carefully monitor the evolution if this indicator. On the other hand, the ratio 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 was 1 for the entire evaluation period (with one exception: 2020/2021 - 1.13).

In conclusion, the educational and research activity in the Physics PhD field at Babeș-Bolyai University meets all the evaluation criteria, often exceeding the quantitative indicators, as a result of the full involvement of the PhD supervisors, all the teaching staff and decision makers, providing an example of excellence worthy of being followed.

VII. Annexes

- *The detailed schedule of the evaluation visit – MANDATORY.*

AGENȚIA ROMÂNĂ DE ASIGURARE A CALITĂȚII ÎN ÎNVĂȚĂMÂNTUL SUPERIOR
*Membră în Asociația Europeană pentru Asigurarea Calității în Învățământul Superior - **ENQA***
*Înscrisă în Registrul European pentru Asigurarea Calității în Învățământul Superior - **EQAR***

Nr. 5278 /30.09.2021

Programul[1] vizitei de evaluare instituțională - IOSUD / domenii de studii universitare de doctorat a **Universității Babeș-Bolyai din Cluj-Napoca**
The timetable of the institutional evaluation visit - IOSUD / doctoral study domains at the
Babeș-Bolyai University of Cluj-Napoca

Perioada vizitei de evaluare: 02-05.11.2021
The period of the evaluation: 02-05.11.2021

Evaluarea Externă Periodică a IOSUD și a domeniilor de studii universitare de doctorat
Periodical External Evaluation of the Institution Organising Doctoral Study Programs (IOSUD), and of the doctoral study domains

Data/ ora *Date/ hour* (Bucharest time)	**Activitate/** ***Activity***	**Participanți/** ***Participants***	**Observații/** ***Remarks***
		Marți / *Tuesday*, **02.11.2021**	
09:00-09:50	Întâlnire preliminară online pentru pregătirea și armonizarea etapelor de evaluare, în modul mixt, la nivel de domeniu de doctorat și IOSUD *Online preliminary meeting for the preparation and harmonization of evaluation steps, in hybrid mode, of doctoral study domain and IOSUD*	- toți membrii echipei de evaluare *all members of the evaluation team*	Apăsați aici pentru conectare platforma ARACIS ZOOM *Click here to join ARACIS ZOOM platform*

[1] În perioada vizitei pot fi solicitate și alte întâlniri, pentru eventuale clarificări.
During the visit other meetings may be requested for possible clarifications.

B-dul Mărăști nr. 59, sect. 1, București, tel. 021.206.76.00, fax 021.312.71.35
Email: office@aracis.ro, www.aracis.ro

Data/ ora Date/ hour (Bucharest time)	Activitate/ *Activity*	Participanți/ *Participants*	Observații/ *Remarks*
	review and the team responsible for the internal evaluation report	- responsabilul domeniului de studii de doctorat și echipa care a realizat raportul de evaluare internă *the doctoral study domain contact person and the team responsible for the internal evaluation report*	
12.00-12.50	Întâlnire online a comisiei de experți evaluatori pentru IOSUD cu cadre didactice din școlile doctorale ale IOSUD *Online meeting of IOSUD evaluation panel members with academic staff of the doctoral schools* **DDa**: Întâlnire online a comisiei de experți evaluatori cu cadre didactice din domeniul de studii de doctorat evaluat ***DDa**: Online meeting with academic staff of the doctoral study domain under review*	- membrii comisiei de experți evaluatori pentru IOSUD *- members of IOSUD evaluation panel* - cadre didactice din școlile doctorale ale IOSUD *academic staff of the doctoral schools* - membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain* - cadre didactice din domeniul de studii de doctorat evaluat *academic staff of the doctoral study domain*	Apăsați aici pentru conectare *Click here to join* **Vezi Anexa DDa, atașată programului vizitei/** ***Please see Annex DDa attached to the timetable***
13.00-13.50	Întâlnire online a comisiei de experți evaluatori pentru IOSUD cu Comisia de Etică *Online meeting of IOSUD evaluation panel members with the Etics Commission*	- membrii comisiei de experți evaluatori pentru IOSUD *- members of IOSUD evaluation panel* - membrii Comisiei de Etică *members of the Etics Commission*	Apăsați aici pentru conectare *Click here to join*

Data/ ora Date/ hour (Bucharest time)	Activitate/ *Activity*	Participanți/ *Participants*	Observații/ *Remarks*
14:00-14:50	**DDb**[3]: Întâlnire online a comisiei de experți evaluatori pentru DD cu responsabilul domeniului de studii universitare de doctorat evaluat și cu echipa care a realizat raportul de evaluare internă ***DDb***[3]*: Online meeting with the contact person for the doctoral study domain under review and the team responsible for the internal evaluation report*	- membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain* - responsabilul domeniului de studii de doctorat și echipa care a realizat raportul de evaluare internă *the doctoral study domain contact person and the team responsible for the internal evaluation report*	**Vezi Anexa DDb, atașată programului vizitei/** ***Please see Annex DDb attached to the timetable***
15:00-15:50	**DDb**: Întâlnire online a comisiei de experți evaluatori cu cadre didactice din domeniul de studii de doctorat evaluat ***DDb****: Online meeting with academic staff of the doctoral study domain under review*	- membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain* - cadre didactice din domeniul de studii de doctorat evaluat *academic staff of the doctoral study domain*	**Vezi Anexa DDb, atașată programului vizitei/** ***Please see Annex DDb attached to the timetable***
16:00-16:50	**DDb**: Întâlnire online a comisiei de experți evaluatori cu angajatorii din domeniul de studii de doctorat evaluat ***DDb****: Online meeting with employers representatives of the doctoral study domain under review*	- membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain* - angajatori din domeniul de studii de doctorat evaluat *employers representatives of the doctoral study domain*	**Vezi Anexa DDb, atașată programului vizitei/** ***Please see Annex DDb attached to the timetable***

[3]Pentru toate întâlnirile din program unde se menționează **DDb**, se vor organiza întâlniri, în paralel, pentru domeniile de doctorat listate în secțiunea B de la finalul acestui document.
*For all the meetings where **DDa** is mentioned, parallel meetings will be organized for the doctoral domains listed in section B, at the end of this document.*

Data/ ora Date/ hour (Bucharest time)	Activitate/ *Activity*	Participanți/ *Participants*	Observații/ *Remarks*
17:00- 17:50	Întâlnire online a comisiei de experți evaluatori pentru IOSUD cu angajatorii *Online meeting of IOSUD evaluation panel members with the employers representatives*	- membrii comisiei de experți evaluatori pentru IOSUD *- members of IOSUD evaluation panel* - angajatori *employers representatives*	Apăsati aici pentru conectare *Click here to join*
	DDa: Întâlnire online a comisiei de experți evaluatori cu angajatorii din domeniul de studii de doctorat evaluat ***DDa****: Online meeting with employers representatives of the doctoral study domain under review*	- membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain* - angajatori din domeniul de studii de doctorat evaluat *employers representatives of the doctoral study domain*	**Vezi Anexa DDa, atașată programului vizitei/** ***Please see Annex DDa attached to the timetable***
18:00- 19:00	Întâlnire **tehnică** online, pentru discuții privind prima zi de evaluare *Online technical meeting for discussions on the evaluation Day 1*	- membrii comisiei de experți evaluatori pentru IOSUD *- members of IOSUD evaluation panel* - membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain*	Apăsati aici pentru conectare platforma ARACIS ZOOM *Click here to join ARACIS ZOOM platform* Întâlnirile pe domenii de doctorat (individual sau mai multe domenii, acolo unde experții evaluatori sunt comuni) sunt organizate descentralizat. Înregistrările vor fi salvate și încărcate, ulterior, în cloud-ul ARACIS
Miercuri/ *Wednesday*, **03.11.2021**			

Data/ ora Date/ hour (Bucharest time)	Activitate/ *Activity*	Participanți/ *Participants*	Observații/ *Remarks*
09:00-09:50	**DDb**: Întâlnire online a comisiei de experți evaluatori cu studenții din domeniul de studii de doctorat evaluat ***DDb**: Online meeting with students of the doctoral study domain under review*	- membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain* - studenți din domeniul de studii de doctorat evaluat *graduates of the doctoral study domain*	**Vezi Anexa DDb, atașată programului vizitei/** ***Please see Annex DDb attached to the timetable***
10:00-10:50	**DDb**: Întâlnire online a comisiei de experți evaluatori cu absolvenții din domeniul de studii de doctorat evaluat ***DDb**: Online meeting with graduates of the doctoral study domain under review*	- membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain* - absolvenți din domeniul de studii de doctorat evaluat *graduates of the doctoral study domain*	**Vezi Anexa DDb, atașată programului vizitei/** ***Please see Annex DDb attached to the timetable***
11:00- 11:50	Întâlnire online a comisiei de experți evaluatori pentru IOSUD cu studenți ai școlilor doctorale ale IOSUD *Online meeting of IOSUD evaluation panel members with students of the doctoral schools* **DDa**: Întâlnire online a comisiei de experți evaluatori cu studenții din domeniul de studii de doctorat evaluat ***DDa**: Online meeting with students of the doctoral study domain under review*	- membrii comisiei de experți evaluatori pentru IOSUD *- members of IOSUD evaluation panel* - studenți din școlile doctorale ale IOSUD *students of the doctoral schools* - membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain* - studenți din domeniul de studii de doctorat evaluat *students of the doctoral study domain*	Apăsati aici pentru conectare platforma ARACIS ZOOM *Click here to join ARACIS ZOOM platform* **Vezi Anexa DDa, atașată programului vizitei/** ***Please see Annex DDa attached to the timetable***

Data/ ora Date/ hour (Bucharest time)	Activitate/ *Activity*	Participanți/ *Participants*	Observații/ *Remarks*
12:00-12:50	Întâlnire online a comisiei de experți evaluatori pentru IOSUD cu absolvenți *Online meeting of IOSUD evaluation panel members with graduates* **DDa**: Întâlnire online a comisiei de experți evaluatori cu absolvenții din domeniul de studii de doctorat evaluat ***DDa**: Online meeting with students of the doctoral study domain under review*	- membrii comisiei de experți evaluatori pentru IOSUD *- members of IOSUD evaluation panel* - absolvenți ai școlilor doctorale ale IOSUD *graduats of the doctoral schools* - membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain* - absolvenți din domeniul de studii de doctorat evaluat *graduates of the doctoral study domain*	Apăsati aici pentru conectare *Click here to join* **Vezi Anexa DDa, atașată programului vizitei/** ***Please see Annex DDa attached to the timetable***
13:00- 17.00	Activitate în cadrul comisiilor de evaluare: IOSUD și domenii de studii doctorale/ *Activity within the evaluation panels: IOSUD and doctoral study domains* Respectiv/ *Respectively* Deplasarea reprezentanților echipei de evaluare pentru vizita la fața locului/ *Travel of evaluation panels representatives for the on-site visit*	Comisiile de evaluare pentru IOSUD și pentru domeniile de doctorat *Evaluation panels for IOSUD and doctoral domains*	Se lucrează independent și/ sau în colaborare cu membrii comisiei; platforma ARACIS Ciscowebex/ ZOOM (dacă e cazul) *Independent and/ or collaborative work with other panel members; ARACIS Cisco webex/ ZOOM platform (if the case)*
18:30- 19:30	Întâlnire tehnică online, pentru identificarea aspectelor specifice care trebuie clarificate pe parcursul vizitei la fața locului (dacă este cazul)	- membrii comisiei de experți evaluatori pentru IOSUD *- members of IOSUD evaluation panel*	Apăsati aici pentru conectare platforma ARACIS ZOOM *Click here to join ARACIS ZOOM platform*

Data/ ora Date/ hour (Bucharest time)	Activitate/ *Activity*	Participanți/ *Participants*	Observații/ *Remarks*
	Online technical meeting to identify specific issues that need to be clarified during the on-site visit (if the case)	- membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain*	Întâlnirile pe domenii de doctorat (individual sau mai multe domenii, acolo unde experții evaluatori sunt comuni) sunt organizate descentralizat. Înregistrările vor fi salvate și încărcate, ulterior, în cloud-ul ARACIS
Joi / *Thursday*, 04.11.2021			
09:00-17:00	Reuniuni de lucru față în față[4], vizitarea bazei materiale didactice și de cercetare *Face-to-face working meetings[3], visit of the educational and research infrastructure* Programul va include întâlniri cu: conducerea universității, reprezentanți ai Consiliului CSUD și ai Consiliului școlii doctorale, reprezentanți ai Comisiei de etică, reprezentanți ai universității implicați în asigurarea internă a calității studiilor doctorale, reprezentanți ai centrelor de cercetare din domeniile de doctorat evaluate. *The program will include meetings with: university management, representatives of the CSUD Council and the Doctoral School Council, representatives of the Ethics*	- directorul de misiune, coordonatorul comisiei de evaluare a IOSUD, coordonatorii comisiilor de evaluare a domeniilor de doctorat, student evaluator *the director of the evaluation mission, the coordinator of the IOSUD evaluation panel, the coordinators of doctoral domain evaluation panels, student evaluator* - reprezentanți ai universității *university representatives*	Vizită la fața locului *On-site visit* De comun acord cu universitatea, întâlnirile de lucru pot fi organizate astfel încât la ele să participe și membrii comisiilor de evaluare ce nu vor fi prezenți la fața locului, dacă aceștia vor considera necesar. *In agreement with the university, the working meetings can be organized so that the members of the evaluation panels who will not be present on site to be able to participate as well, if they deem it necessary.*

[4] Experții evaluatori la nivelul domeniilor de studii universitare de doctorat pot stabili independent programul vizitei la fața locului, de comun acord cu persoana de contact de la domeniul evaluat și respectând programul întâlnirilor comune cu restul membrilor echipei de evaluare. *The evaluators at doctoral study domain level can independently establish the program of the on-site visit, in agreement with the contact person for the evaluated domain and respecting the schedule of joint meetings with the rest of the evaluation panel members.*

Data/ ora Date/ hour (Bucharest time)	Activitate/ *Activity*	Participanți/ *Participants*	Observații/ *Remarks*
	Commission, university representatives involved in internal quality assurance of doctoral studies, representatives of the research centers in the doctoral domains under review.		
Vineri / *Friday*, 05.11.2021			
09:00- 09:50	Întâlnire **tehnică** online, pentru prezentarea celor constatate în cadrul vizitei la fața locului *Online technical meeting to identify specific issues that need to be clarified, if necessary, during the on-site visit*	- membrii comisiei de experți evaluatori pentru IOSUD *- members of IOSUD evaluation panel* - membrii comisiei de experți evaluatori pentru domeniul de studii de doctorat *evaluation panel members for doctoral study domain*	Apăsati aici pentru conectare platforma ARACIS ZOOM *Click here to join ARACIS ZOOM platform* Întâlnirile pe domenii de doctorat (individual sau mai multe domenii, acolo unde experții evaluatori sunt comuni) sunt organizate descentralizat. Înregistrările vor fi salvate și încărcate, ulterior, în cloud-ul ARACIS
10:00- 13:50	Finalizarea documentelor *Completion of the evaluation documents*	Comisiile de evaluare pentru IOSUD și pentru domeniile de doctorat *Evaluation panels for IOSUD and doctoral domains*	Se lucrează independent și/ sau în colaborare cu membrii comisiei; platforma ARACIS Ciscowebex/ ZOOM (dacă e cazul) *Independent and/ or collaborative work with other panel members; ARACIS Cisco webex/ ZOOM platform (if the case)*
14:00-15:20	Întâlnire online pentru **concluzii** *Online meeting for conclusions*	- toți membrii echipei de evaluare *all members of the evaluation team*	Apăsati aici pentru conectare platforma ARACIS ZOOM *Click here to join ARACIS ZOOM platform*
15:30-16:30	Întâlnire **finală** online în vederea prezentării principalelor constatări rezultate în urma evaluării la nivel de	- toți membrii echipei de evaluare *all members of the evaluation team*	Apăsati aici pentru conectare *Click here to join*

Data/ ora Date/ hour (Bucharest time)	Activitate/ *Activity*	Participanți/ *Participants*	Observații/ *Remarks*
	domenii de doctorat și IOSUD și a recomandărilor de îmbunătățire a calității *Meeting with representatives of the institution under review to discuss on the conclusions of the evaluation process and the main reccomandations*	- reprezentanții universității *university representatives*	

Prof. univ. dr. Simona LACHE
Director de misiune

Prof. univ. dr. Daniel DAVID
Rector

Împărțirea pe secțiuni a domeniilor de studii universitare de doctorat pentru organizarea corespunzătoare a întâlnirilor online:

Secțiunea A (DDa)	Secțiunea B (DDb)
Matematică	Informatică
Fizică	Chimie
Geografie	Știința mediului
Inginerie chimică	Geologie
Sociologie	Biologie
Psihologie	Inginerie mecanică
Științe Politice	Științe ale comunicării
Drept	Relații internaționale și studii europene
Contabilitate	Științe ale educației
Economie	Științe administrative
Finanțe	Cibernetică și statistică
Marketing	Management
Istorie	Filosofie
Teologie	Filologie
Teatru și artele spectacolului	Cinematografie și media
	Știința sportului și educației fizice