## ANNEX No. 4

## PUBLIC INFORMATION CONCERNING THE OPEN POSITION

Name of field	Description
Faculty	Faculty of Physics
Department	Condensed Matter Physics and Advanced Technologies
Job position ID	8
Job position title	Professor
Lectures to be taught	FME1202 Solid State Electronics /master - in English
	FME1403 Transport Phenomena in Solid /master - in English
	FME1404 Nanostructures and applications/master -in English
	FME3304 Research Traineeship, master - in English
	Research in the field of Solid-State Physics, thin films, spintronics, information manipulation technologies.
Scientific field	Physics
Description of the job	The open position includes teaching, research, and work with the students.
	The open position covers the theoretical, practical and seminar activities for the following disciplines: Solid State Electronics (Master Sc. level, course, and seminar), Transport Phenomena in Solid (Master Sc. level, course and seminar), Nanostructures and Applications (Master Sc. level, course and seminar), Research Traineeship (Master Sc. level).
	The research activities of the candidate must be in the field of the opened position (Solid State Physics, Nanomagnetism and Spintronics, Electronic transport phenomena in solid, Nanostructures and applications, experimental techniques for elaboration and characterization of thin films, multilayer heterostructures, magnetic materials with tailored functional properties, micro and nanostructuration techniques of mesoscopic spintronic devices).
	This position implies teaching activities (courses, seminars and laboratory classes) having the following objectives:
	1. Acquiring of fundamental theoretical and practical competences in Physics and in technological Physics by the undergraduate and the graduate students.
	2. Independent use by the students of the instruments and the experimental equipments from the didactic and research laboratories, to perform dedicated measurements and experiments.

	3. Guidance of the students and of the young researchers.
	Besides the theoretical/practical skills for teaching activities, this position also implies the development of research activities in the field of Physics, Materials Science and Patterned Mesoscopic Devices. The aim is understanding of essential aspects related to material design and control of some of their functional properties, to be able to design materials, heterostructures and devices with technological applications potential, understand correlated aspects related to dimensionality, structure, morphology, static and dynamic magnetic and transport properties.
	The candidate must have expertise in experimental techniques for the elaboration of thin films and complex magnetic heterostructures, specific structural, morphological and transport characterization techniques of thin films, surfaces and interfaces, micro and nano-patterning techniques of mesoscopic spintronic devices with technological applications in sensors and data storage technologies, design of specific equipment for thin films elaboration in ultra-high vacuum. The candidate must have solid knowledge of Solid-State Physics, mesoscopic magnetism, Solid State Electronics. He/she should master: specific characterization techniques for magnetic and electrical properties of low- dimensional systems, morphological and magnetic properties of surfaces, multilayer heterostructures and micro / nano magnetic structures, specific techniques for deposition of thin films in ultra- high vacuum.
	The Faculty's internal commission will filter the applications which do not fulfill the above conditions and will give negative recommendation.
	The position requires scientific records in agreement with the scientific field, job description and research domain described in the call.
	The position implies that the candidate has a PhD degree in the field of the job and a habilitation diploma or the equivalated quality of PhD advisor in Physics.
	The candidate should present either a certificate of linguistic competence (English language), obtained at the Alfa Center of the Faculty of Letters - BBU, with the minimum grade C1 or an equivalent certificate (Cambridge, etc) or he has to prove that he has spent minimum 9 months cumulated stages in a foreign country.
Responsibilities	Conventional hours per week: 9.08 from which 4.07 – Solid State Electronics – master in English, 2.04 – Transport phenomena in solid – master in English, 2.04 – Nanostructures and applications – master in English, 0.94 - Research Traineeship – master in English
	Other activities: activities related to teaching preparing 500 hours, scientific activities 501 hours, civic activities 501 hours.
Schedule of presentation	08.07.2021/ starting from 11.00 AM, 1 hour for each candidate
Place of presentation	Babeş-Bolyai University, Faculty of Physics, Str. Mihail
	Kogălniceanu nr.1, RO-400084, Cluj-Napoca, Augustin Maior

	Amphitheatre.
Competition tests, date, time and place	Competition tests
	1. Analysis of the candidate's file records;
	2. Public presentation (30 minutes, followed by a question- answer session). The subject of the presentation will be chosen by candidate and it will belong to the research field of the open position. The presentation will be followed by a question-and-answer session in English. Date, time, and place: 08.07.2021/ starting from 11.00 AM, 1 hour for each candidate, Babeş-Bolyai University, Faculty of Physics, Str. Mihail Kogălniceanu nr.1, RO-400084, Cluj-Napoca, Augustin Maior Amphitheatre.
Topics and references	Topics:
	<ol> <li>Structural, morphological, and magnetic properties of low dimensional systems: surfaces, interfaces, thin films, nanostructures.</li> </ol>
	2. Spin and charge transport phenomena in multilayered heterostructures based on thin films.
	3. Physics and technology of nanomaterials and mesoscopic spintronic devices.
	References:
	1. Scientific journals.
	2. Introduction to Solid State Physics, C. Kittel, (7ed., Wiley, 1996)
	3. Magnetism and Magnetic Materials, J.M.D. Coey, Ed. Cambridge University Press (2009).
	4. Magnetic domains. The analysis of Magnetic Microstructures, A. Hubert, R. Schafer, Springer Berlin Heidelberg New York (2009).
	5. Introduction to Nano Basics to Nanoscience and Nanotechnology, Engineering Materials, A. Sengupta, C. K. Sarkar, Ed. Springer-Verlag GmbH (2015).
	6. Solid State Electronic Devices: Global Edition, B. G. Streetman, S. K. Banerjee, Ed. Pearson Ed. Ltd. (2016).
	7. Spintronics Handbook, 2 <sup>nd</sup> Edition: Spin Transport and Magnetism, Vol.3: Nanoscale Spintronics and Applications, edited By E. Y. Tsymbal, I. Žutić, Ed. CRC Press (2021).
	8. Electronic transport in mesoscopic systems, S. Datta, Ed. Cambridge University Press, (2013).

	<ul> <li>9. Handbook of Thin Film Deposition, edited by K. Seshan, D. Schepis, Publisher: William Andrew; 4th edition (March 13, 2018).</li> <li>10. Principles of Lithography, Third Edition, SPIE Press Monograph, Vol. PM198, (2011).</li> <li>11. Frances Hellman et al.: Interface-induced phenomena in magnetism, Reviews of Modern Physics, Vol 89, (2017).</li> <li>12. A. Hirohata et al, Review on spintronics: Principles and device applications, J. Magn. Magn. Mater. 509 166711, (2020).</li> <li>13. F.Giustino et al, The 2021 quantum materials roadmap, J. Phys. Mater. 3 042006 (2020).</li> </ul>
	14. W. Han et al, Quantum materials for spin and charge conversion, npj Quantum Materials 27, (2018).
Description of the selection	<ul> <li>a) Conditions for participation:</li> <li>Good knowledge of Romanian and English.</li> <li>Holding a BSc diploma in Physics or/and Engineering.</li> <li>Holding a PhD in Physics.</li> <li>Having experience in using laboratory equipment to study structural, morphological, electrical, and magneto-electrical properties of materials and nanostructures with different technologic applications at different scales: macro, micro and nano.</li> <li>Having research experience in the field of the opened position: nanostructures and technological applications, electronic transport in solid: spin electronics, experimental elaboration, characterization, and lithographic patterning of thin films, heterostructures and mesoscopic spintronic devices.</li> <li>Holding Habilitation certificate or the equivalated quality of PhD advisor in Physics.</li> <li>To meet the legal conditions to occupy the open position.</li> <li>b) Conditions for the contest tests:</li> </ul>
	1. Analysis of the candidate's file records (marks from 1 to 10)

The contest commission evaluates the candidate's file records
from the following aspects:
• the relevance and impact of the scientific activity of the candidates;
• the ability to supervise students and young researchers;
<ul> <li>didactical skills of the candidates;</li> </ul>
• candidate's ability to transfer knowledge to economic or
social environment and to disseminate their scientific results;
• the candidate's ability for team-works and effectiveness
of their scientific collaborations.
• Candidate's ability to manage R&D activities
Professional experience of applicants in institutions
other than the Babeş-Bolyai University.
2. Public presentation and answer to questions (marks from 1 to 10)
The minimum mark for each test is 6 (six), the final grade is
minimum 7 (seven) for each evaluator.
<b>Final grade</b> is calculated in the following manner: 75 % analysis of the candidate's file records, 25 % public presentation. For admission, the candidates have to obtain a final grade better than 8.50 (eight 50%).
In case of equality, the classification criteria are in the following order: the file records grade, the grade for presentation, the average grade of the B.Sc. years of study.

## Head of department

## Prof.dr. Romulus TETEAN

