EXTERNAL REMOTE EXPERT
ASSESSMENT REPORT OF SAS RESEARCH INSTITUTE

Period January 1, 2016 – December 31, 2021

According to § I, section 15 and 16 of Principles of periodic assessment of SAS research institutes adopted under the regulation of § 10, section 5, letter d) Act No. 133/2002 Coll. on Slovak Academy of Sciences and approved by the SAS Assembly on November 21, 2021, the member of Panel of evaluators/ Invited external remote expert issues the report with following evaluation and proposal for Institute rating.

Name and address of SAS Institute	Institute of Experimental Physics Slovak Academy of Sciences (IEP SAS) (Ústav experimentálnej fyziky Slovenskej akadémie vied, v. v. i. (ÚEF SAV, v. v. i.)) Watsonova 47 040 01 Košice Slovak Republic

Scientific quality and productivity

Comments, including strengths and weaknesses (recommended number of characters with spaces up to 4000)	**Rating***

General remark: Because of its size (number of researchers - around 80 and budget around 3.2 million EUR/year), the Institute has limited resources. Nevertheless, there is a rather broad spectrum to topics and large number of research groups (18), each comprising 8 or less members. Taking this into account, the scientific quality (selected examples below) and productivity (over 200 papers a year, most in internationally recognized journals) should be regarded as very good. Depending on the field, maintained or increased productivity and visibility compared to previous evaluation periods. Research quality and management effectiveness look solid. Strengths (a) seven (including PROMATECH) joint laboratories with local universities (including Žilina and Bratislava) allowing reaching a critical mass of users and access of students to the Institute facilities and expertise (b) Centre of Low Temperature Physics – unique experimental facility run with the Šafárik University, which has continued to be the Košiče visit card; the Centre is a partner in a prestigious EC project (European Microkelvin Platform (H2020; 2019-2022). Several important results concerning spin waves in 3He; phase transitions in superconductors; nature of surface states in SmB6 have been obtained in the reported period, some completed in-house, some within international collaboration, most published in high impact journals. Particularly impressive is a list of new experimental methods introduced during the report period. (c) strong and internationally recognized position in materials science, including magnetic fluids, magnetic nanoparticles, superconductors; visibility proven by the citation record (d) valuable and well cited publications in chemical-(bio)physics – development of new compounds with a potential for new generation of drugs – partly within extensive international collaboration including theoretical a theoretical support of Warsaw's Mai Suan Li (e) long staying participation in flag-ship CERN projects; co-authoring of important and cutting-edge papers; however, as everywhere, it is hard to compare output to other physics branches; do the output per budget takes the CERN annual fee payed by Slovakia into account? How the annual fee compares to reinvestment of CERN is Slovakia? (f) active and successful collaboration European (ESA) but also with Japanese and USA space research projects; also cosmic ray research at Lomnica peak (g) innovative and thought-generating theory papers (h) impressive number of won projects from national sources – typical project budget rather generous compared to European median. (i) active international collaborations within low-budget bilateral projects (e.g. a long term collaboration with Grenoble) and two trans-European COST European actions (j) a relatively good gender balance; many female young researches won prizes.	**B**

Weaknesses (a) Except for Microkelvin Platform, unsuccessful applications for high-profile H2020 projects (ERC, Marie Curie-Sklodowska actions, and focussed projects); would smaller number of research fields but with a critical mass of researchers be helpful? (b) a relatively weak brain circulation/internationalization (in-coming and out-coming research stays from abroad/to abroad) though compensated by collaboration within the Platform and COSTs projects (c) too low number of PhD student (of course, this is a globe-wide challenge in physics); would internationalization of PhD studies be helpful?	

Societal, cultural, or economic impact

Comments, including strengths and weaknesses (recommended number of characters with spaces up to 4000)	**Rating***
General remark: Societal, cultural, or economic impact appears in many ways and should be evaluated as very good. Strengths (a) PhD studies in cooperation with three faculties of local universities. In the reported period new specializations were opened: (i) biophysics, (ii) physical engineering of advanced materials in 2016, and (iii) advanced materials in 2019 (b) participation in teaching in local universities (c) a satisfactory number of foreign patents and application-relevant research (crioengineering, nanoparticles, drug-related research, …) (d) a strong record of outreach activities for the physics community (organization of conferences/focus workshops; participation in scientific committees) and for the public at large (popularization) Weaknesses (a) lack of licensing (e.g. to companies specializing in research equipment, accessories, materials, chemical reagents, software, …) (b) no information found on spin-off/on-campus companies originating from the Institute research.	**B**

- **Strategy and potential for development**

Comments (recommended number of characters with spaces up to 4000)	**Rating***
There two worthwhile new initiatives: (a) Cassovia New Industry Cluster, a new initiative encompassing Košice‘s three universities, three research institutes (including the	**B**

Institute), university hospital, regional government, and private companies aiming at boosting cooperation of academia and industrial sector (b) Slovak National Research Platform on Quantum Technologies, Institute's low temperature laboratory being a founding member As far as superconductor research are concerned a closer tie with Czechia's company CAN Superconductors is envisaged. Other groups plan to reach a higher level based on their to-date accomplishments. No strength-weakness-risk-opportunity analysis is provided and no major modifications in the Institute strategy are proposed in the report.	

***Rating in scale from A to D, where A is** A is internationally leading; A/B part is internationally leading, overall is visible at the European context; B is visible at European context; B/C part is visible at the European context, overall is solid; C is solid; C/D is partly solid; D is not solid;*

OVERALL ASSESSMENT

Comments on the past performance

The evaluation period in question has been heavily marked by (i) a tremendous rise of international competitiveness, especially in physics and materials science, associated with an enormous rise of high-level output from China and (ii) Covid pandemic. Nevertheless, the Institute has maintained and in many aspects increased its international visibility despite with difficulties in acquiring sufficient amount of highly talented PhD students. In general, taking available resources into account, I rank the Institute high and congratulate the Institute management and personnel the accomplishments obtained in the reported period.

Comments and recommendations for further improvement and development of the institute

Recommendations to be considered

(a) internationalization of PhD studies; (i) all lectures, seminars, and group meetings should be carried out in English; (ii) typically candidates from India and Iran are expected and a careful screening is required

(b) more focussed topics to be sure that the number of team members reaches an optimum magnitude to solve experimentally or theoretically high-profile challenges

(c) develop an innovative and entrepreneurial spirit: could my code or sample holder be sold, e.g., by licensing to a company? Could I organize a start-up?

(d) despite a low to-date success rate, continue attempts to submit collaborative or individual projects to Horizon Europe

(e) strength-weakness-risk-opportunity analysis might help the Institute executive body to plan and implement modifications in the Institute organisational structure, research topics, and day-by-day management.

Proposal of overall institute rating:

B

Date, September 2, 2022