

Periodic Assessment of Research, Development, Artistic and Other Creative Activities VER 2026

Final Report of the Physical Sciences Sub-panel

The Sub Panel Members (SPMembers) notice that the fields covered by these institutions were in general very broad going from fundamental physics to technical developments and from analytic chemistry to particle physics.

According to the whole set of **outputs**, given the relatively small size and scale of higher education in Slovakia, the sub-panel is impressed by its commitments to research excellence and by its ability to participate in and lead international collaborations. The SPMembers grade two institutions between world leader and top international recognition and four between top international recognition and good international recognition. The research done in Slovakia is competitive with other European countries.

As for **societal Impacts**, the average grade is close to a good international recognition.

The SPMembers find that, regarding the application potential of the six institutions, some additional efforts could be made to improve a higher return to society. Nevertheless, the score is correct but slightly behind other European countries.

Across the **creative environment statements**, the institutions describe substantial research environments with solid infrastructure, active international collaborations, and a broad range of scientific activities. In several cases, the integration of research with education, doctoral training, and international facilities is highlighted as a clear strength, indicating a good research and career pipeline. Units of assessment show excellent or good levels of research activity, with notable engagement in experimental work, some societal outreach, and good support for early career researchers. In contrast, a recurring theme

across all statements is the limited articulation of a clear strategic vision. Several submissions would benefit from stronger strategic prioritisation of key research areas, a clearer narrative of institutional strengths and competitive advantages, and more explicit evidence of research excellence and impact. In particular, the materials sometimes describe activities and infrastructure effectively but provide less clarity about long-term ambitions, strategic direction, and positioning within the international physics research community. Institutions are encouraged to focus on ambitious vision statements that discuss strategic thinking over the next 5-10 years.

In all cases, the level of international collaborations is excellent. It ranges from very large scale laboratories to international European organisations such as CERN or ESA. At the national level, even if some good examples of synergies were noticed between and inside several institutions, the sub-panel members found that there was room for improvement between laboratories working on adjacent subjects.

In most of the institutions, a large place is given to the education of PhD and graduate students via mentors, training to various physics competitions, regular PhD seminars, extensions of existing programs for mobility exchanges, students internships, fellowships through Erasmus programs, etc. In addition, most of the institutes pay a lot of attention to popular-science activities which are directed towards the schools and the general public. The sub-panel members endorse these actions which will be prolific to attract national and international young scientists in their laboratories.

As for resources, the SPMembers notice some strong discrepancies between institutions regarding the level of external grants, going from less than 15 % to more than 110% of the funding from the state. The SPMembers consider that this ratio (from excellent to less than average) needs to be corrected and recommend the ministry to encourage more proactive actions to establish an equilibrium between the institutions. For example, light support

dedicated to researchers to improve their collaborations abroad through participation in international conferences or visiting external laboratories would certainly increase the chances to get EU contracts as Marie Curie Fellowship or ERC.

Conclusion & recommendations

The research in physics in the Slovak Republic, presents a very broad and scientifically sound set of activities competitive with the other countries in Europe. The environment benefits from international collaborations, substantial technical infrastructure, and participation in major scientific facilities. The statements demonstrate commitment to interdisciplinary research, international mobility and societal engagement. Slovakia's research performance exceeds what its scale would suggest.

However, the sub-panel members noticed that most of the institutes were in difficulty to properly explain their position in terms of international leadership or strategic differentiation. Most of the statements lack a visionary leadership perspective, something grand to aspire to, something that motivates the next generation to work extra hard, something that makes people want to push their research to the absolute top that they can achieve. Often, the strategy formulation is defensive, placing heavy emphasis on national underfunding which does not seem to be the case.

To help the institutes have confidence in themselves and in the future, the members of the sub-panel suggest the Ministry of Education, Research, Development and Youth of the Slovak Republic to organize one or more meetings between the institutes to further discuss their practices, strengthen synergies and ask them for a forward-looking report on what they aim to achieve over a time scale of about ten years.

Criteria for assessments

For the assessments, the criteria used by the SPMembers addressed the various dimensions of scientific quality and were as follows:

- **Relevance:** has the topic a large scientific impact? Is it relevant for the scientific community?
- **Originality:** is the work original and innovative? does it sound as new or dated? (except if it is a new approach of a well-known historical question)
- **Significance:** is it a breakthrough or is it incremental?
- **Rigor:** how is the level of the methodological quality and scientific rigor of the output?

World-leading (1)

- the topic has a large impact in term of scientific / technical / societal audience
- the work is a breakthrough and is not incremental
- the work is original and does not sound as dated
- the technical quality and scientific rigor are perfect

It should be noticed that this rating was only given 8 times out of 158

Internationally excellent (2)

- the work is a breakthrough and is not incremental
- the work is original and does not sound as dated
- the technical quality and scientific rigor are perfect

It should be noticed that this rating was only given 79 times out of 158

Internationally recognized (3)

- the work can be incremental but the increment is relevant
- the technical quality and scientific rigor are perfect

It should be noticed that this rating was only given 67 times out of 158

Nationally recognized (4)

- the work is incremental
- the technical quality and scientific rigor are correct

It should be noticed that this rating was only given 2 times out of 158

Below the standard of nationally recognized work (5)

- the interest of the work is marginal
- the technical quality and scientific rigor are questionable

It should be noticed that this rating was not given

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