

Evaluation of the Research and Professional Activity of the Institutes of the Czech Academy of Sciences (CAS) for the period 2010–2014

Final Report on the Evaluation of the Institute

Name of the Institute: Institute of Scientific Instruments of the CAS, v. v. i.

Fields, in which the Institute registered its teams:

Physical sciences

Observer representing the Academy Council of the CAS: Tomáš Kruml

Observer representing the Institute: Pavel Zemánek, substitute observer Pavel Jurák

Commission No. 3: Physical sciences

Chair: Prof. John Dainton

Date(s) of the visit of the Institute: October 15 - October 23, 2015

Programme of the visit of the Institute: see attached Minutes from the visit

Evaluated research teams:

No. 5 - Optical micro-manipulation techniques

A. Evaluation of the Institute as a whole

1. Introduction

The Physical Sciences panel determined that an overall evaluation of the Institute of Scientific Instruments of the CAS was inappropriate because it received only the information necessary to provide a full evaluation of Team No. 5: Optical micro-manipulation techniques.

2. Strengths and Opportunities

See introduction

3. Weaknesses and Threats

See introduction

4. Recommendations

See introduction

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

Declaration on the involvement of students in research

Declaration on societal relevance

Declaration on the position in the international and national context

Declaration on the vitality and sustainability

Declaration on the strategy and plans for the future

B. Evaluation of the individual teams

Evaluation of the Team No. 5: Optical micro-manipulation techniques

1. Introduction

The main direction of the research conducted by this group is focused on nanoscale and microscale interactions of laser beams with matter. In addition to providing some novel optical means to sort and/or to trap the microorganisms or microstructures, the group combines them with conventional detection systems like Raman spectroscopy or fluorescence detection. This combination looks very promising, by increasing characterization and detection capabilities in microfluidic systems. The main direction of research is well chosen, and is well supported by the available team expertise and by their impressive infrastructure. The research includes fundamental as well as applied aspects, and leads to a capability of custom design work for external partners.

2. Strengths and Opportunities

The strength of the group is well demonstrated by their fundamental research on the optical “tractor” beams with a view to create a sorting means for building of microstructures, and published in Nature Photonics. Another strength is their applied research on optical diagnostics, trapping and sorting of living micro-organisms. This might lead to faster and more specific methods of detecting various strains of bacteria, a clear potential benefit to the society.

3. Weaknesses and Threats

No particular weaknesses has been observed in this team, and the Committee sees no threats to its present direction of research

4. Recommendations

Continue this interesting and competitive research, with even more focus on biological and biomedical applications, where the need and the market for better and more cost effective detection techniques is huge.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

The majority of evaluated outputs of this team is internationally excellent and some of them are world leading

Declaration on the involvement of students in research

The team is very active in supervising students (currently 5 PhD and 4 MSc) although no PhD graduated during the evaluation period. The team gave many valuable lectures and seminars, and participated on many Committees involved in student activities

Declaration on societal relevance

The team is exceptionally active in science and research popularization, both locally and internationally. They organize the Open days for the public and frequently present their research to the media

Declaration on the position in the international and national context

The team has established successful collaboration at the international and national level, with both academia and industrial partners

Declaration on the vitality and sustainability

The age profile of the team is very good and guarantees continuing and further developing its current research activities.

Declaration on the strategy and plans for the future

The plans for the future and strategy are well thought out and inspired by highly successful current research achievements

Date: January 13, 2016

Commission Chair: Prof. John Dainton