Report on the

Crete Center for Theoretical Physics

Conclusions of the Scientific Advisory Board Meeting
July 20-21, 2012

Members of the Board:

Curtis CALLAN, Princeton University, USA

Jean ILIOPOULOS, LPTENS, Paris, France

Gabriele VENEZIANO, CERN Switzerland and Collège de France, Paris, France

Contents

1 Executive Summary

The Scientific Advisory Board of the Crete Center for Theoretical Physics (CCTP) met on July 20-21, 2012 at the University of Crete for the purpose of evaluating the success of the Center in meeting the goals it had set for itself at the time of its creation in 2009. The EU had provided funding through a program (REGPOT) that aims, broadly speaking, to nucleate new high impact, scientific centers of excellence in scientifically under-served EU periphery regions. Our mandate was to evaluate whether this funding had in fact been used to create an activity that met these ambitious goals. In a nutshell, our answer is an unqualified 'yes': the CCTP has, in three short years, consolidated Crete on the European scientific map as a place where high quality research in frontier theoretical particle physics is done, and as a place where ambitious young particle theorists, especially postdocs, can go to advance their careers. We emphasize that bringing this about in just three years is a remarkable achievement, due in large measure to the energy, scientific acumen and organizational skill of the director and senior members of the CCTP. We are also pleased to note that the group has recently obtained a three year grant from the Greek General Secretariat for Research and Technology as a result of a very good evaluation obtained by a project Professor Kiritsis submitted to ERC. This new grant ensures the continuation of the Center's activity for a second three-year period.

While it is not within our mandate, we cannot refrain from noting that the crisis conditions that now obtain in Greece put the longer-term sustainability of this success at substantial risk. The freezing of faculty positions is especially damaging in this regard: a central element of the original CCTP plan was the addition of at least one excellent faculty component researcher; an outstanding one was identified and recruited but, upon that person's arrival, the promised position was canceled. If this problem is not somehow managed, what has been gained could be lost in short order. It occurs to us that the EU might want to think of temporary modifications of the conditions of the REGPOT program that would help protect successful investments of EU resources such as the CCTP in this difficult, but hopefully temporary, period.

In the following, we present a detailed account of the various elements that support our overall judgment that the CCTP has been a success, as well as our estimation of the Center's medium and long term perspectives. These elements are: 1. Scientific production, 2. Attractiveness to students and postdocs, 3. Interactions with other major scientific institutions, 4. Scientific communication and education, 5. Scientific outreach. To the ex-

tent possible, we will offer quantitative evidence in addition to offering our qualitative impressions.

2 Evaluation

In this section we present the detailed elements on which we base our overall assessment.

2.1 Scientific production

The rate of scientific production at the CCTP has more than doubled in the last three years. Data indicate that most of the increase is due to the activity of the group of post-doctoral fellows that joined CCTP at the beginning of the sponsored program, working both on their own and in collaboration with core faculty members of the Center. The papers that represent the Center's work product are consistently published in high impact factor international journals, and some of them have been highlighted by special mentions and/or have gathered large numbers of citations. The publications span a large spectrum of research subjects within the broad area of quantum field theory, gravitational phenomena and string theory. Although conventional phenomenology is somewhat under-represented, applications of holographic ideas to high-energy and condensed-matter physics has been actively pursued. As a whole holography-related ideas stood out as one of the recurring themes in the research carried out by the post-doctoral fellows. Last, but not least, the fact that all departing fellows have found good jobs in leading institutes across the world is clear evidence that their scientific production is well-appreciated by the theoretical physics community.

2.2 Attractiveness to postdocs and students

The CCTP has, in three short years, established itself as a very attractive place in which to pursue postdoctoral work in particle theory. Applications for CCTP positions are channeled through a central website, jointly sponsored by 20 major European particle theory institutes, through which applicants indicate the top 5 institutions (in rank order) by which they wish to be considered. More than 400 applicants each year indicate that they wish to be considered by CCTP and, until this year, CCTP was in the top few institutions in the consortium in terms of the number of applicants for which

it was first or second choice[1]. In addition, the CCTP is now systematically able to recruit from the top of the short list that it creates after reviewing these applications. Considering the strength of the other institutions with which CCTP is competing, these are remarkable facts. As another indicator, we were told that the CCTP now receives more than 10 requests per year to sponsor Marie Curie fellowship applicants, up from 1-2 per year before the CCTP was established. Another important metric is the number of non-Greek applicants to the University of Crete for graduate study in particle theory (i.e. to study with faculty associated with the CCTP): this has gone from zero to about twenty per year since the CCTP was established. This increased attractiveness to postdocs and students is, in our view, due to the success of the CCTP in assembling a critical mass of excellent researchers who work together in a vibrant research community, and in communicating this fact to the larger European particle theory community.

2.3 Scientific communication and education

These two aspects of the Center's work plan have been energetically developed. In addition to the two workshops and the conference the CCTP foreseen in the three-year plan, a regional meeting and an Aegean school were organized in nearby Greek islands. All of these events attracted very prominent speakers and a large number of participants. Furthermore, several CCTP members have co-organized workshops abroad (in Italy, Germany, France, and ICTP) with two more (in Italy and in Japan) in the pipeline. Besides teaching undergraduates and masters students and directing masters and Ph.D. theses, members of CCTP have organized international courses attended by both local and foreign students. An intensive graduate course of this kind will be organized in the spring of 2013 with the expected participation of students from several EU countries and from Israel.

2.4 Scientific outreach

The Members of the Board were impressed by the broad spectrum of outreach activities organized by the group. They are addressed primarily to high school students and their teachers, but also to the general public. They aim at popularizing high energy physics, its principles, techniques and results, through specialized courses, lectures and exhibitions. We notice, in

[1]It is however necessary to note that this year CCTP abruptly came in near the bottom in this same statistic, almost certainly because of the effect on applicants' minds of the crisis conditions in Greece.

particular, a dedicated program, organized in common with many other European countries, during which teams from various high schools compete in real time to perform particle identification in experiments which go on at CERN.

3 Medium and long term perspectives

As we said above, the immediate future of the Center is secured by a new three year grant obtained from the Greek General Secretariat for Research and Technology (GSRT). However, the chronic lack of institutional support for scientific research in the country, combined with the recent extreme financial crisis from which Greece is suffering, may jeopardize the medium and long-term perspectives of any effort to sustain research groups of international standards. In the following we shall briefly state the elements which apply specifically to CCTP.

3.1 Ability to attract new grants

The senior members of the group have the necessary scientific level and reputation to compete successfully for national and European research grants. A proposal submitted recently by Professor Kiritsis to the ERC advanced grants program was very favorably evaluated and, as a result, was funded by GSRT. Other proposals are now in the process of being evaluated. So, the short-term future of the group seems to be secured. The board however notices that all this support comes from European structural funds and cannot replace, in the long run, the absence of any purely national research program.

3.2 New faculty positions

In our 2009 report we had expressed our appreciation for the efforts made by the host physics department to strengthen its theoretical physics group by recruiting new, excellent, faculty members. Unfortunately, these efforts have not been successful. The freezing of all hirings in the Greek public sector resulting from the recent economic crisis has affected universities and research centers. The senior positions the group was hoping to obtain have not materialized and, most importantly, Dr Vasilis Niarchos, a brilliant young scientist, has not been offered the junior faculty position he was promised. He is now on a fixed-term appointment supported by a three year

grant, but, unless he finds a tenure track position fairly soon, he is likely to leave the country.

3.3 Relations with the Administrative environment

The members of the Board have identified some important problems, mainly related to Greek national regulations, which put severe constraints on the development of active research groups, such as the one we are reviewing, that are trying to establish strong ties with the international scientific community.

The most important seems to be the legislation concerning the employment of young foreign research associates at the post-doctoral level. The difficulties appear at almost all steps: absence of any real effort to apply the regulations concerning a specific visa for fixed term visiting scientists, a totally inadequate legal framework for employment, and an upper limit for their salary which is too low, especially if we take into account the associated social charges and taxes. It is urgent to adapt the legislation to bring it into accord with international practice.

A second problem, which we had noticed in our 2009 report, concerns the inadequate support offered by the university administration to foreign scholars who have been recruited into research positions. These scholars must comply with extremely complex regulations and, in the absence of specialized personnel to deal with these matters, the secretary of the group is by default their guide through the administrative maze. This puts an unfair load on the group secretary, who is employed only part-time and has many other duties to perform.

4 Conclusions

The EU program which supported the group during the last three years has been an outstanding success. The Members of the Board express their full appreciation to the staff members, the postdocs and the students of the Center who, with their talent, dedication and efforts, made this success possible. We wish to thank them for making our visit to Crete a most instructive and enjoyable experience.