



16 Virtual Institute of Astroparticle Physics in Online Discussion of Physics Beyond the Standard Model

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Abstract. Virtual Institute of Astroparticle Physics (VIA), integrated in the structure of Laboratory of AstroParticle physics and Cosmology (APC) is evolved in a unique multi-functional complex of science and education online. It supports participation in conferences and meetings, various forms of collaborative scientific work as well as programs of education at distance. The activity of VIA takes place on its website <http://viavca.in2p3.fr/site.html>. The format of VIA videoconferences was effectively used in the program of XVI Bled Workshop to provide a world-wide participation at distance in discussion of the open questions of physics beyond the standard model. The VIA system has demonstrated its high quality and stability for participation in discussions from different parts of the world without any technical assistance at place.

Povzetek. Virtual Institute of Astroparticle Physics (VIA), vključen v sestavo Laboratorija of AstroParticle physics and Cosmology (APC) v Parizu, se je razvil v edinstven vsestranski kompleks za znanost in izobraževanje na spletu. Podpira sodelovanje na konferencah in sestankih, različne oblike skupnega znanstvenega dela in programe za izobraževanje na daljavo. Aktivnosti instituta VIA se odvijajo na njegovi spletni strani <http://viavca.in2p3.fr/site.html>. Oblika video konferenc, kot jih organizira VIA, je bila učinkovito uporabljena v sklopu programa 16. blejske delavnice za omogočanje sodelovanja na daljavo iz vsega sveta v diskusijah odprtih vprašanj fizike onkraj standardnega modela. Sistem instituta VIA je dokazal, da lahko omogoča visoko kvaliteto in stabilnost prisotnosti udeležencev iz različnih delov sveta v diskusijah, brez zahteve po tehnični pomoči na kraju samem.

16.1 Introduction

Studies in astroparticle physics link astrophysics, cosmology, particle and nuclear physics and involve hundreds of scientific groups linked by regional networks (like ASPERA/ApPEC [1,2]) and national centers. The exciting progress in these studies will have impact on the knowledge on the structure of microworld and Universe in their fundamental relationship and on the basic, still unknown, physical laws of Nature (see e.g. [3,4] for review).

Virtual Institute of Astroparticle Physics (VIA) [5] was organized with the aim to play the role of an unifying and coordinating structure for astroparticle physics. Starting from the January of 2008 the activity of the Institute takes place on its website [6] in a form of regular weekly videoconferences with VIA lectures, covering all the theoretical and experimental activities in astroparticle physics and related topics. The library of records of these lectures, talks and their presentations was accomplished by multi-lingual Forum. In 2008 VIA complex was effectively used for the first time for participation at distance in XI Bled Workshop [7]. Since then VIA videoconferences became a natural part of Bled Workshops' programs, opening the virtual room of discussions to the world-wide audience. Its progress was presented in [8–11]. Here the current state-of-art of VIA complex, integrated since the end of 2009 in the structure of APC Laboratory, is presented in order to clarify the way in which VIA discussion of open questions beyond the standard model took place in the framework of XVI Bled Workshop.

16.2 The structure of VIA complex and forms of its activity

16.2.1 The forms of VIA activity

The structure of VIA complex is illustrated on Fig. 16.1. The home page, presented

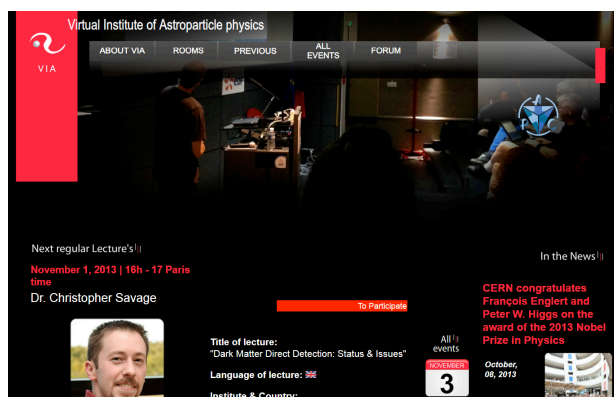


Fig. 16.1. The home page of VIA site.

on this figure, contains the information on VIA activity and menu, linking to directories (along the upper line from left to right): with general information on VIA (About VIA), entrance to VIA virtual rooms (Rooms), the library of records and presentations (Previous) of VIA Lectures (Previous → Lectures), records of online transmissions of Conferences (Previous → Conferences), APC Colloquiums (Previous → APC Colloquiums), APC Seminars (Previous → APC Seminars) and Events (Previous → Events), Calendar of the past and future VIA events (All events) and VIA Forum (Forum). In the upper right angle there are links to Google search engine (Search in site) and to contact information (Contacts).

The announcement of the next VIA lecture and VIA online transmission of APC Colloquium occupy the main part of the homepage with the record of the most recent VIA events below. In the announced time of the event (VIA lecture or transmitted APC Colloquium) it is sufficient to click on "to participate" on the announcement and to Enter as Guest (printing your name) in the corresponding Virtual room. The Calendar links to the program of future VIA lectures and events. The right column on the VIA homepage lists the announcements of the regularly up-dated hot news of Astroparticle physics and related areas.

In 2010 special COSMOVIA tours were undertaken in Switzerland (Geneva), Belgium (Brussels, Liege) and Italy (Turin, Pisa, Bari, Lecce) in order to test stability of VIA online transmissions from different parts of Europe. Positive results of these tests have proved the stability of VIA system and stimulated this practice at XIII Bled Workshop. These tours involved special equipment, including, in particular, the use of the sensitive audio system KONFTEL 300W [12]. The records of the videoconferences at the XIII Bled Workshop are available on VIA site [13].

Since 2011 VIA facility is used for the tasks of the Paris Center of Cosmological Physics (PCCP), chaired by G. Smoot and for the public programme "The two infinities" conveyed by J.L.Robert. It regularly effectively supports participation at distance at meetings of the Double Chooz collaboration: the experimentalists, being at shift, took part in the collaboration meeting in such a virtual way.

The simplicity of VIA facility for ordinary users was demonstrated at XIV Bled Workshop. Videoconferences at this Workshop had no special technical support except for WiFi Internet connection and ordinary laptops with their internal video and audio equipments. This test has proved the ability to use VIA facility at any place with at least decent Internet connection. Of course the quality of records is not as good in this case as with the use of special equipment, but still it is sufficient to support fruitful scientific discussion as can be illustrated by the record of VIA presentation "New physics and its experimental probes" given by John Ellis from his office in CERN (see the records in [14]).

In 2012 VIA facility, regularly used for programs of VIA lectures and transmission of APC Colloquiums, has extended its applications to support M.Khlopov's talk at distance at Astrophysics seminar in Moscow, videoconference in PCCP, participation at distance in APC-Hamburg-Oxford network meeting as well as to provide online transmissions from the lectures at Science Festival 2012 in University Paris7. VIA communication has effectively resolved the problem of referee's attendance at the defence of PhD thesis by Mariana Vargas in APC. The referees made their reports and participated in discussion in the regime of VIA videoconference.

In 2013 VIA lecture by Prof. Martin Pohl was one of the first places at which the first hand information on the first results of AMS02 experiment was presented [15].

In 2012 VIA facility was first used for online transmissions from the Science Festival in the University Paris 7. This tradition was continued in 2013, when the transmissions of meetings at Journées nationales du Développement Logiciel (JDEV2013) at Ecole Polytechnique (Paris) were organized [16].

The discussion of questions that were put forward in the interactive VIA events can be continued and extended on VIA Forum. The Forum is intended to cover the topics: beyond the standard model, astroparticle physics, cosmology, gravitational wave experiments, astrophysics, neutrinos. Presently activated in English, French and Russian with trivial extension to other languages, the Forum represents a first step on the way to multi-lingual character of VIA complex and its activity.

One of the interesting forms of Forum activity is the educational work at distance. For the last four years M.Khlopov's course "Introduction to cosmoparticle physics" is given in the form of VIA videoconferences and the records of these lectures and their ppt presentations are put in the corresponding directory of the Forum [17]. Having attended the VIA course of lectures in order to be admitted to exam students should put on Forum a post with their small thesis. Professor's comments and proposed corrections are put in a Post reply so that students should continuously present on Forum improved versions of work until it is accepted as satisfactory. Then they are admitted to pass their exam. The record of videoconference with their oral exam is also put in the corresponding directory of Forum. Such procedure provides completely transparent way of evaluation of students' knowledge.

16.2.2 Organisation of VIA events and meetings

First tests of VIA system, described in [5,7-9], involved various systems of videoconferencing. They included skype, VRVS, EVO, WEBEX, marratech and adobe Connect. In the result of these tests the adobe Connect system was chosen and properly acquired. Its advantages are: relatively easy use for participants, a possibility to make presentation in a video contact between presenter and audience, a possibility to make high quality records, to use a whiteboard facility for discussions, the option to open desktop and to work online with texts in any format. The regular form of VIA meetings assumes that their time and Virtual room are announced in advance. Since the access to the Virtual room is strictly controlled by administration, the invited participants should enter the Room as Guests, typing their names, and their entrance and successive ability to use video and audio system is authorized by the Host of the meeting. The normal amount of connections to the virtual room at VIA lectures and discussions usually didn't exceed 20. However, the sensational character of the exciting news on superluminal propagation of neutrinos acquired the number of participants, exceeding this allowed upper limit at the talk "OPERA versus Maxwell and Einstein" given by John Ellis from CERN. The complete record of this talk and is available on VIA website [18]. For the first time the problem of necessity in extension of this limit was put forward and it was resolved by creation of a virtual "infinity room", which can host any reasonable amount of participants. Starting from 2013 this room became the only main virtual VIA room, but for specific events, like Collaboration meetings or transmissions from science festivals, special virtual rooms can be created.

The ppt or pdf file of presentation is uploaded in the system in advance and then demonstrated in the central window. Video images of presenter and

participants appear in the right window, while in the upper left window the list of all the attendees is given. To protect the quality of sound and record, the participants are required to switch out their microphones during presentation and to use lower left Chat window for immediate comments and urgent questions. The Chat window can be also used by participants, having no microphone, for questions and comments during Discussion. The interactive form of VIA lectures provides oral discussion, comments and questions during the lecture. Participant should use in this case a "raise hand" option, so that presenter gets signal to switch our his microphone and let the participant to speak. In the end of presentation the central window can be used for a whiteboard utility as well as the whole structure of windows can be changed, e.g. by making full screen the window with the images of participants of discussion.

Regular activity of VIA as a part of APC includes online transmissions of all the APC Colloquiums and of some topical APC Seminars, which may be of interest for a wide audience. Online transmissions are arranged in the manner, most convenient for presenters, prepared to give their talk in the conference room in a normal way, projecting slides from their laptop on the screen. Having uploaded in advance these slides in the VIA system, VIA operator, sitting in the conference room, changes them following presenter, directing simultaneously webcam on the presenter and the audience.

16.3 VIA Sessions at XVI Bled Workshop

VIA sessions of XVI Bled Workshop have developed from the first experience at XI Bled Workshop [7] and their more regular practice at XII, XIII, XIV and XV Bled Workshops [8–11]. They became a regular part of the Bled Workshop's programme.

In the course of XVI Bled Workshop meeting the list of open questions was stipulated, which was proposed for wide discussion with the use of VIA facility. The list of these questions was put on VIA Forum (see [19]) and all the participants of VIA sessions were invited to address them during VIA discussions. During the XVI Bled Workshop the test of not only minimal necessary equipment, but either of the use of VIA facility by ordinary users was undertaken. VIA Sessions were supported by personal laptop with WiFi Internet connection only, as well as in 2012 the members of VIA team were physically absent in Bled and all the videoconferences were directed by M.Khlopov and assisted by D.Rouable at distance from Paris. It proved the possibility to provide effective interactive online VIA videoconferences even in the absence of any special equipment and qualified personnel at place. Only laptop with microphone and webcam together with WiFi Internet connection was proved to be sufficient not only for attendance, but also for VIA presentations and discussions.

In the framework of the program of XVI Bled Workshop, R. Cerulli, staying in his office in LNGS, Gran Sasso gave his talk "DAMA/LIBRA results and perspectives" (Fig. 16.2) and took part in the discussion of puzzles of dark matter searches, which provided a brilliant demonstration of the interactivity of VIA in the way most natural for the non-formal atmosphere of Bled Workshops (see records in [20]). In the period of Workshop I. Antoniadis took part in Conference in Japan but



Fig. 16.2. VIA talk by R.Cerulli from LNGS Gran Sasso at XVI Bled Workshop and Discussion Bled-Paris- Moscow-CERN-Gran Sasso-Marburg-Liege.

owing to VIA facility he has managed to contribute his talk “Mass hierarchy and physics beyond the Standard Model” to the programme of XVI Bled Workshop (Fig. 16.3).

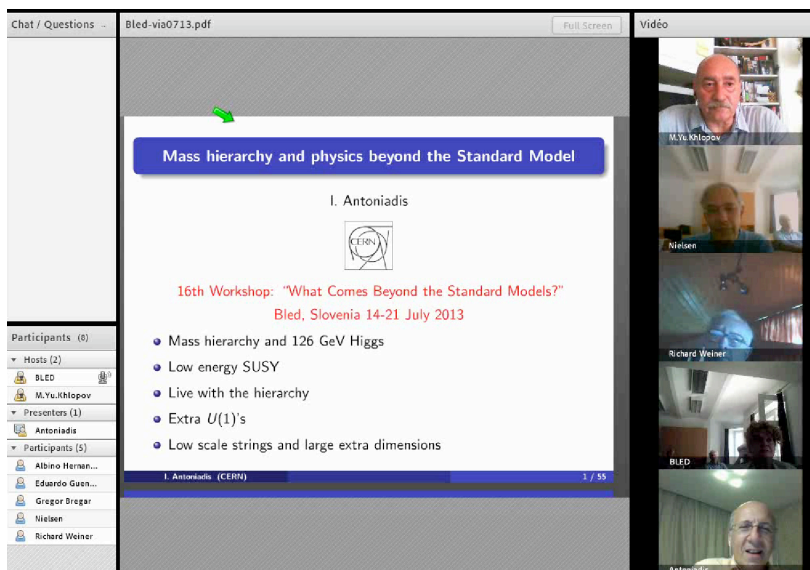


Fig. 16.3. VIA talk by I.Antoniadis from Japan at XVI Bled Workshop and Discussion Bled-Paris- Moscow-CERN-Tokyo-Marburg-Liege.

The videoconference with the talk *The Spin-Charge-Family-Theory* explains the origin of families, predicts their number, explains the origin of charges, of gauge vector and scalar fields by Norma Mankoc-Borstnik in Bled was followed by discussion with distant participants. In particular, in the course of this discussion M.Khlopov could present from Paris some aspects of cosmology of mirror world (Fig. 16.4).

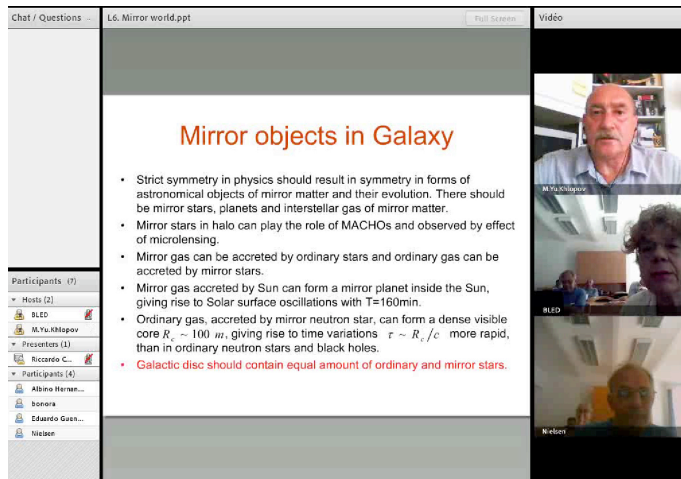


Fig. 16.4. VIA talk by N. Mankoc-Borstnik at XVI Bled Workshop and Discussion Bled-Paris-Moscow-CERN-Marburg-Liege.

VIA sessions also included the talk "Status of the ATLAS experiment" by Anatoly Romaniouk (Fig. 16.5) followed by VIA discussion of problems of experimental search for new physics at accelerators. VIA sessions provided participation at distance in Bled discussions for M.Khlopov (APC, Paris, France), R. Cerulli (Gran Sasso, Italy), I.Antoniadis (CERN, participated from Japan), K.Belotsky (MEPhI, Moscow), J.-R. Cudell and Q.Wallemacq (Liege, Belgium), R.Weiner (Marburg, Germany) and many others.

16.4 Conclusions

The Scientific-Educational complex of Virtual Institute of Astroparticle physics provides regular communication between different groups and scientists, working in different scientific fields and parts of the world, the first-hand information on the newest scientific results, as well as support for various educational programs at distance. This activity would easily allow finding mutual interest and organizing task forces for different scientific topics of astroparticle physics and related topics. It can help in the elaboration of strategy of experimental particle, nuclear, astrophysical and cosmological studies as well as in proper analysis of experimental data. It can provide young talented people from all over the world to get the

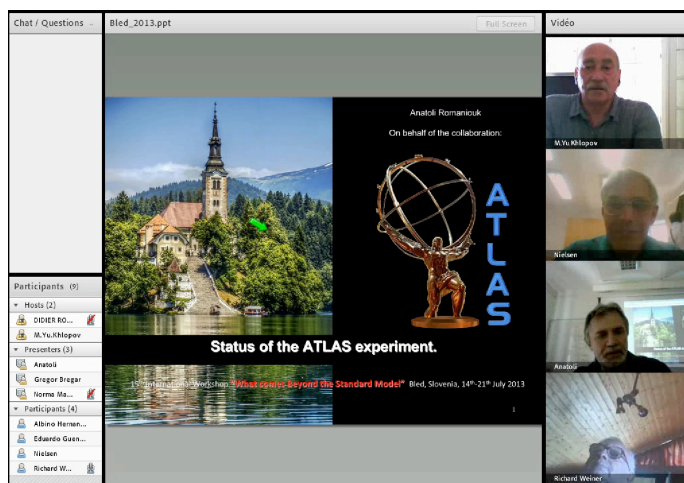


Fig. 16.5. VIA talk by A. Romaniouk at XVI Bled Workshop and Discussion Bled-Paris-Moscow-CERN-Marburg-Liege.

highest level education, come in direct interactive contact with the world known scientists and to find their place in the fundamental research. VIA applications can go far beyond the particular tasks of astroparticle physics and give rise to an interactive system of mass media communications.

VIA sessions became a natural part of a program of Bled Workshops, maintaining the platform of discussions of physics beyond the Standard Model for distant participants from all the world. The experience of VIA applications at Bled Workshops plays important role in the development of VIA facility as an effective tool of science and education online.

Acknowledgements

The initial step of creation of VIA was supported by ASPERA. I am grateful to P.Binetruy, J.Ellis and S.Katsanevas for permanent stimulating support, to J.C. Hamilton for support in VIA integration in the structure of APC laboratory, to K.Belotsky, A.Kirillov and K.Shibaev for assistance in educational VIA program, to A.Mayorov, A.Romaniouk and E.Soldatov for fruitful collaboration, to M.Pohl, C. Kouvaris, J.-R.Cudell, C. Giunti, G. Cella, G. Fogli and F. DePaolis for cooperation in the tests of VIA online transmissions in Switzerland, Belgium and Italy and to D.Rouable for help in technical realization and support of VIA complex. I express my gratitude to N.S. Mankoč Borštnik, G.Bregar, D. Lukman, N. Chasnikov and all Organizers of Bled Workshop for cooperation in the organization of VIA Sessions at XVI Bled Workshop.

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