



PRC Technical Design Review ALPS II 7 November 2012 at DESY site Zeuthen

Introduction

Solutions to the dark sector of the universe might not only be found at the TeV scale but could also hide at very low mass scales. There is a growing physics community that strives to explore fundamental questions by probing new physics at low energy scales¹

The ALPS experiment at DESY (<http://alps.desy.de/>) constitutes an experiment of the “light-shining-through-walls”-type where incoming laser photons are possibly converted into some kind of weakly interacting slim particle (WISP) in front of a wall and reconverted into photons behind that wall. Such searches are very sensitive to small WISP couplings. ALPS I successfully concluded its data taking by end of 2009 and surpassed the sensitivity of previous experiments by nearly an order of magnitude².

Preparations towards an enlarged installation, ALPS II, using the employment of several straightened HERA dipole magnets, a high-power laser system and the pioneering realization of a regeneration cavity have started. The upgraded experiment could provide for a sensitivity gain of more than three orders of magnitude in comparison to its predecessor ALPS I and includes the exploration of axion-like particles, hidden photons and mini-charged particles.

Technical Design Review:

The DESY PRC is an external scientific committee and gives advice to the DESY directorate on all matters related to the particle and astroparticle physics programme at DESY. The PRC has regularly followed and closely monitored the progress of the ALPS collaboration and has encouraged the collaboration to submit an ALPS-II technical design report (TDR) which was submitted by 31 August 2012 and distributed to the committee. The latest version of TDR (with corrections in the Excel table) is available at:

<http://adweb.desy.de/~lindner/ALPS-II-TDR-120926.pdf>.

The PRC will conduct a technical design review of this ALPS II proposal on 7 November 2012 at DESY site Zeuthen. The review will be held by PRC members augmented by external experts from various fields who work in similar experimental settings or have significant experience on technical components that are planned for implementation for the ALPS-II upgrade.

The purpose of this review is to assess in depth the technical design, performance and feasibility of the ALPS II upgrade as documented in the TDR. The review should evaluate all technical components of the planned experiment as well as an assessment of project issues such as management, costs, resources and schedule. The committee is asked to evaluate the general scope of the project as presented in the TDR compared to the scientific objectives and to further consider the physics case in view of the presented TDR.

¹ “Hidden Sector Photons, Axions, and WISPs Working Group working report”, available at <https://confluence.slac.stanford.edu/download/attachments/111247955/hspaw.pdf>

² K. Ehret, M. Frede, S. Ghazaryan, M. Hildebrandt, E. -A. Knabbe, D. Kracht, A. Lindner and J. List et al., Phys. Lett. B 689, 149 (2010) [arXiv:1004.1313 [hep-ex]]

Draft Agenda of the Review

The review will be conducted on 7 November 2012 at DESY site Zeuthen. It is a one-day meeting with open (together with ALPS-II members) and closed sessions (reviewers only).

(06 November 2012 – 19:00: Common Dinner in Seehotel for all reviewers who arrive a day earlier)

07 November 2012

- 09:30 Executive Session (Committee only)
- 10:00 Open Session (presentations by ALPS II collaborators)
 - ALPS II - Introduction/Overview -20'
 - Scientific Case/Physics Goals -15'
 - Laser and Optics Systems – 15'
 - Detection System/Camera/TES – 15'
 - Magnet/Cryo/Vacuum – 15'
 - Questions, Discussions
- 12:30 Lunch
- 13:30 Open Session (presentation by ALPS II collaboration)
 - Costing and Schedule – 20'
 - Questions, Discussions
- 14:15 Closed Session: observations and findings, open issues to be addressed by the collaboration, preparation of input to the PRC
- ~16:00 End

Review Committee:

The committee consists of members from the DESY PRC (<http://prc.desy.de>) and is chaired by Andy White (UTA). The committee will be augmented by external experts: The members are:

- PRC members:
 - Andy White, UTA, PRC Chair and Chair of the review committee
 - Marcela Carena, FNAL
 - Günter Quast Karlsruhe Institute for Technology KIT
- External expert members:
 - Laser/Quantum Optics: Gerhard Leuchs, Director Max Planck Institute for the Science of Light, Erlangen
 - Gravitational Wave Detection: James Hough, Glasgow U
 - Transition edge sensor, SC thin film structures: Andreas Engel, U Zurich
 - Expert from other experiment with similar scope: David Tanner, University of Florida
 - Theory: Pierre Sikivie, University of Florida
- Ex-officio members and others
 - Joachim Mnich, Director for astroparticle and particle physics, DESY
 - Frank Lehner, Scientific Secretary, DESY
 - Joern Schaffran, DESY, consultant/expert for vacuum/cryo/magnets