

## PREFACE

The International Symposium “Advances in Dark Matter and Particle Physics” was held from October 24<sup>th</sup> to 27<sup>th</sup> 2016 at the University of Messina in Sicily (Italy). The Symposium took place in the suggestive library room of the “Accademia Peoloritana dei Pericolanti” where sixty researchers, specialist in particle physics and accelerator machines, coming from various Universities and Laboratories of the world, have presented and discussed their projects sharing the own experience in order to overcome common technical problems. The latest results of running experiments and new ideas in dark matter and dark force searches at accelerators, precision measurements in particle physics testing the Standard Model, the most advanced simulation tools, event generator codes, and theoretical predictions, have been presented by 39 talks followed by intense discussions and round tables.

Particularly, the latest limits on a visibly and invisibly-decaying dark photon have been shown in the broader context of dark forces and light dark matter searches performed by using complementary approaches as beam dump experiments (APEX, BDX and HPS at JLAB, LDMX at SLAC, MMAPS at Cornell, PADME at LNF), radiative meson decays and the study of ISR processes at colliders (BABAR at SLAC, KLOE2 at LNF). Moreover, new promising studies such as the  $^8\text{Be}$  anomaly and other search proposals able to probe the hypothesis of the anti-gravitation of antimatter, have been reported. The opportunities offered by different facilities providing different intense beams have been also presented. The synergy with the most important simulation tools (Geant4) and event generators (Phokhara and Babayaga) have been presented and discussed in a dedicated session. In the symposium, it has been reviewed and discussed, from both experimental and theoretical point of view, other important topics relevant in astrophysics, high precision tests of Standard Model (anomalous magnetic moment of muon and hadronic contribution measurements), meson resonances formation in hadronic and non-hadronic channels, hadron spectroscopy, leptons and electromagnetic radiation. In particular, the latest results of the A2, BaBar, BESII, CMD-3, SND, KLOE2 Collaborations have been presented and discussed.

The Symposium also hosted a satellite meeting of participants to dark photon initiatives in Italy (PADME at LNF) and USA (MMAPS at Cornell and JLAB), together with colleagues from other European labs (VEPP-3), in order to establish a stronger coordination and collaboration among the different experimental groups on both sides of the Atlantic. The PADME

and MMAPS initiative, in particular, started the process of joining forces on the realization of the invisible dark photon experiments with the missing mass technique. The Symposium and the satellite Italy-USA meeting has been sponsored by the Italian Ministry for Foreign Affairs and International Cooperation, CUP I86D16000060005.

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