

Preface

G. CORCELLA⁽¹⁾, S. DE CURTIS⁽²⁾, S. MORETTI⁽³⁾⁽⁴⁾ and G. PANCHERI⁽¹⁾

⁽¹⁾ *INFN, Laboratori Nazionali di Frascati - Frascati (RM), Italy*

⁽²⁾ *INFN, Sezione di Firenze - Sesto Fiorentino (FI), Italy*

⁽³⁾ *School of Physics and Astronomy, University of Southampton
Southampton SO17 1BJ, UK*

⁽⁴⁾ *Particle Physics Department, Rutherford Appleton Laboratory
Chilton, Didcot, Oxon OX11 0QX, UK*

The workshop *LC13: Exploring QCD from the infrared regime to heavy flavour scales at B-factories, the LHC and a Linear Collider*, held at the European Center for Theoretical Physics (ECT*), Villazzano (TN), Italy, on September 16-20, 2013, has been part of a series of meetings exploring the physics of electron-positron collisions at very high energy Linear Colliders (LCs). In particular, such a forum aims at stimulating the discussion on the opportunities offered by the different LC projects under discussion through the particle physics community. The workshops took place in Italy in order to gather the Italian community together with scientists from everywhere in the world. Previous editions have been held in Florence (2007), Perugia (2009), Frascati (2008 and 2010) and again at ECT* (2011).

The meetings are organised with plenary sessions (working groups), discussing Standard Model physics (Quantum Chromodynamics, top-quark phenomenology, electroweak interactions, Higgs physics, photon-photon collisions, Monte Carlo event generators), as well as new physics scenarios like supersymmetry. The latest LHC results, such as the discovery of a Higgs-like boson, the searches for new physics phenomena and precise Standard Model measurements, along with the recent astrophysics findings, had an obviously strong impact through all the sessions and discussions.

In detail, we had reviews on the status of the LC projects, such as the Japanese LCC, as well as on the physics case for circular colliders. The top-quark working group welcomed presentations on behalf of the Tevatron and LHC experiments and theory talks on the top-production cross section, couplings, progresses in Monte Carlo algorithms, the role of the top quark in the stability of the Higgs potential. The QCD session discussed jets, highlights from ATLAS, CMS and ALICE, QCD effects at small transverse momentum, measurements and calculations for the total, elastic and inelastic cross sections, diffractive processes at the LHC.

The Higgs working group presented updates from the ATLAS and CMS Collaborations and talks addressing Higgs coupling measurements, both within and beyond the Standard Model, and new physics scenarios, like the Composite Higgs and Higgs triplet models. In the BSM session, the focus was on lepton-flavour violation at LHC and LC,

excited heavy leptons, vector-like quarks and nonlinear gauge theories. The main issues debated in the electroweak working group were instead Sudakov resummation, the muon magnetic momentum ($g - 2$), impact of the running couplings on cosmology and inflationary models.

From the astroparticle viewpoint, the topics addressed were the latest results from AMS-02 and radiative corrections to processes involving production and decay of dark matter. The collection of presentations in these proceedings represents therefore a useful review of the state-of-art of high-energy physics after the first LHC run and a number of astrophysics measurements, aiming at future electron-positron colliders. Needless to say, our workshop and the present volume have been possible only thanks to the effort of our extraordinary conveners, who gave an essential contribution to the success of the meeting by inviting the speakers, organising the working groups and editing these proceedings. They are listed here-below:

Elena Accomando, NExT Institute and Southampton University, UK (Higgs physics)

Francesca Borzumati, Tohoku University, Japan (Supersymmetry)

Denis Comelli, INFN Ferrara, Italy (Electroweak interactions)

Gennaro Corcella, INFN, Laboratori Nazionali di Frascati, Italy (Top and QCD)

Aldo Deandrea, IPN Lyon, France (Beyond the Standard Model)

Orlando Panella, INFN Perugia, Italy (Photon-photon collisions)

Massimo Passera, INFN Padova, Italy (Standard Model)

Fulvio Piccinini, INFN Pavia, Italy (Monte Carlo generators)

