

Preface

This volume contains the courses presented at the Third IDPASC School (<http://igfae.usc.es/idpasc/>), held at San Martiño Pinario, Hospedería and Seminario Maior (<http://www.sanmartinpinario.eu>), in the city of Santiago de Compostela, Galiza, Spain, from January 21 to February 2, 2013. This school is the annual common school of the International Doctorate Network in Particle Physics, Astrophysics, and Cosmology, IDPASC (www.idpasc.lip.pt).

IDPASC is an interdisciplinary network formed by more than 20 institutions (universities and research laboratories) from Italy, Slovenia, France, Portugal, Spain, Switzerland, and other non-European countries, as Brazil, and whose international coordinator is Prof. Mário Pimenta of the Instituto Superior Técnico (IST) and Laboratório de Instrumentação e Física Experimental de Partículas (LIP) in Lisbon (Portugal), that has been created with the aim of forming new high-level experts in the fields of Particle Physics, Astrophysics, and Cosmology.

The two former editions of the IDPASC School were held in Sesimbra (Portugal), in December 2010, and in Udine (Italy) in January–February of 2012, respectively, while the Fourth IDPASC School was organized in Braga (Portugal), from January 20 to 28, 2014.

The purpose of the school series is to present before doctorate students from different universities and laboratories in Europe and abroad a large scope of the latest results and current state-of-the-art in the fields of Particle Physics, Astrophysics, and Cosmology, and to further introduce them to the questions now open by the physics potential and experimental challenges connected with the current and future experiments, and, in particular, with the newly available energy ranges.

Following these guidelines, the program of this third edition of the IDPASC School has been planned both by the Academic Council and by the International Committee of the network, whose members ensure every year its adequate and timely formulation, matching the continuous evolution in these fields. The program covers a balanced range of the current activity in these fields worldwide, with courses given by internationally acknowledged physicists, on Basic Features of Hadronic Processes, Quantum Chromodynamics, Physics and Technology of ALICE, LHCb Physics—Parity Violation, The Higgs System in and beyond the

Standard Model, Higgs Searches at the LHC, Theory and Experiment in Cosmic Rays, Numerical Methods and Data Analysis in Particle Physics, Theoretical Cosmology, and AdS/CFT Correspondence. Most of these courses have been complemented by practical and discussion sessions.

The spirit of this series of schools is to favor, not only the chance of young promising physicists to learn the fundamentals, ideas, and methods at the base of hot topics in physics from internationally recognized experts who have contributed to define and conform the topic itself, but also to promote fruitful and informal discussions between young and experience physicists, and among experimentalists and theorists, by giving all of them the opportunity of being together for most of the time during 10 days, while completing a charged but not exhausting program in which many young promising physicists have the first chance to present and discuss their results with other young doctorates and with internationally recognized experts in both experimental and theoretical particle fields.

Apart from the academic and scientific part of the program, the fact of organizing the school in the building of the centuries-old but still acting seminario of San Martiño Pinario has helped in achieving the goal of giving the participants a real approach to the history and culture of the city of Santiago de Compostela, and, more generally, to Galiza as a country in Europe molded by being for more than eight centuries the final point and the goal of the pilgrims way that has given rise and formed the European spirit, through the exchange of knowledge and ideas from all corners in Europe.

The conference dinner at the restaurant of the Hotel-Monumento San Francisco, located at the heart of the old-town in Santiago de Compostela, in which the famous Galician seafood, fish, and meats, cooked in the traditional way but with successful innovative touches, were met by the excellent Galician Albariño white wine and by the reputed red Rioja wine from Northern Spain, was a representation of Galiza, old and new, which combines both tradition and ambition for the future. The banquet ended up by the spelling of the conjure during the burning of queimada (firewater, sugar, and lemon peel), reminiscent of the preromanic times in Galiza, and aimed at chasing away bad spirits and meigas (witches). Let us hope that the drinking degustation of that spelled queimada will prevent Galiza and the whole Europe from giving the needed efforts to support and encourage research and knowledge up.

I want to thank all local organizers for their successful efforts in providing the participants with a comforting atmosphere both for work (with the smooth continuation of the scheduled talks and program), and for getting a true insight into the Galician soul. In particular, the help of María del Carmen Fernández has been fundamental in putting together the financial, informatic, and logistical aspects of the conference. The remarkable work and friendly demeanor by the whole staff of Hospedería San Martiño Pinario has also to be noted, in particular the professional savoir-faire of Adriana Hermida and María Luisa González.

We acknowledge the advice and support of Profs. Mario Pimenta, IST—LIP (Portugal), and Barbara de Lotto, Università di Udine (Italy) to the organization of this school, and we also thank Sandra Dias, LIP (Portugal) and Sandra Muzzin,

Università di Udine (Italy) for their collaboration before, during, and after the school.

Finally, we have to thank all participants, both lecturers and students, since they have been the final responsible for the nice environment created during the school and for the high level of the lectures and discussions that have formed the program of this school. We are especially indebted to all professors for their hard and disciplined work in preparing clear and understandable lectures on very vast and technical topics, and in producing the corresponding written contributions to these proceedings by friendly and timely attending to all requests by the editorial committee.

This conference has been organized with the financial support of the European Union through the Lifelong Learning Programme of the Laboratório de Instrumentação e Física Experimental de Partículas (LIP), Lisbon (Portugal), of the Instituto Superior Técnico (IST), Universidade de Lisboa (Portugal), of the Università degli Studi di Udine (Italy), and of the Universidade de Santiago de Compostela (USC), Galiza (Spain).

Carlos Merino

Lectures on Particle Physics, Astrophysics and
Cosmology

Proceedings of the Third IDPASC School, Santiago de
Compostela, Spain, January 21 -- February 2, 2013
Merino, C. (Ed.)

2015, XXI, 480 p. 246 illus., 151 illus. in color.,
Hardcover

ISBN: 978-3-319-12237-3