Introduction

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Abstract. 4th European Advanced Accelerators Concepts.

More than 250 scientists from all over the world gathered from Sep 15 – 21 at the 4th European Advanced Accelerator Concept Workshop (EAAC) on the Island of Elba in Italy. Specialists from accelerator physics, RF technology, plasma physics, instrumentation and the laser field discussed ideas and directions towards a new generation of ultra compact and cost effective accelerators with ground-breaking applications in science, medicine and industry.

The EAAC was founded by the European Network for Novel Accelerators (EuroNNAc) in 2013 and has grown in its fourth edition into a meeting with world-wide visibility, rapidly catching up with the long tradition of the Advanced Accelerator Concepts workshop (AAC) in the US. At the EAAC senior scientists from various specialties mix with junior experts and a large community of young students, attracted by the promise and success of compact particle accelerators. In 2019 about 50 PhD students presented their work at the EAAC. Besides the reports on scientific achievements the large diversity in gender, age distribution and nationalities made the EAAC 2019 a special event and a great success for the accelerator field.

Alessandro Cianchi (University of Roma “Tor Vergata”), Chair of Program Committee, has organized an outstanding program. The opening talk has been given by the 2018 Nobel Laureate Gerard Mourou who shared with all the participants his “Passion for Light” including some exciting photographs from the Nobel Prize award ceremony, featuring also Donna Strickland, the co-recipient of the 2018 Nobel Prize in Physics.

Figure 1. Group photo of the EAAC 2019 attendants.
Among the many outstanding presentations at EAAC2019, published in these proceedings, we recall here the Petawatt laser guiding and electron beam acceleration to 7.8 GeV in a laser-heated capillary discharge waveguide at BELLA, the new high average power laser plasma accelerator project at DESY (KALDERA), beam manipulation with plasma devices like plasma dechirper and plasma lens at SPARC_LAB and the driver/witness bunch PWFA experiments at FLASHForward.

To complete the advanced accelerator landscape there have been also an overview of high gradient X-band RF technology development in the framework of the EU Design Study XLS_CompactLight together with an advanced design of an ultra-compact X-ray FEL based on advanced cryogenic RF techniques at UCLA. The AWAKE group reported about electron acceleration in the plasma wakefield of a self-modulated proton bunch. The external injection experiment in a LWFA module performed at the Tsinghua University was also presented and discussed. The recent developments in dielectric laser acceleration were reported by the University of Erlangen.

Status reports of the running large facilities (ELI, FACET, FLASH_forward) and the proposal for a future research infrastructure EuPRAXIA were extensively discussed and introduced by a vision on the road to very high energies presented by S. Stapnes (CERN).

A new important event took place at EAAC 2019 for the first time: the “Simon van der Meer Award” ceremony to recognize outstanding early career contributions in novel accelerator science. The price has been sponsored by the European Network for Novel Accelerators (EuroNNAc). It recognizes one individual researcher and consists of a stipend of 3000 euro and a certificate citing the contributions of the recipient. The Award Winner in 2019, selected by an international committee, was Spencer Gessner (CERN) for his outstanding contribution to the development of positron plasma wakefield acceleration experiments at SLAC. Positron acceleration has been also the subject of his outstanding workshop closing talk.

Many logistics problems have been solved thanks to the crucial support from the organizations “Frontier accelerators” and “Frontier Detectors for Frontier Physics”. We thank the Director of INFN Pisa Prof. Marco Grassi and the Director of LNF Dr. Pierluigi Campana for their great hospitality and help in making the EAAC2019 such a successful event. Finally, the two of us as chairmen could not have organized the EAAC2019 without the great support of the people in the local organizing committee, helping us with their time and work. We thank Francesca Casarin, Maria Rita Ferrazza, Maurizio Garzella, Mauro Giannini, Lucia Lilli, Mauro Rossi, Vinicio Tullio from INFN, Susanne Schaefer from DESY and the DESY EU office for their never-tiring help and support. Particular thanks go to Maria Pia Anania, Jessica Scifo and Fabio Villa for the excellent support they gave in the preparation of the scientific program. For the proceedings we thanks also Marcel Weschke from Desy for his support in the process. The conference proceedings have been edited by Alessandro Cianchi, Ralph Assmann, Massimo Ferrario, Bernhard Holzer, Phu Anh Phi Nghiem, Nicolas Delerue, Lucas Schaper, Roman Walczak, Edda Gschwendttner, Paul Andreas Walker.

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