CHEP 2019: Preface to the Proceedings

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Abstract. The 24th International Conference on Computing in High Energy and Nuclear Physics (CHEP) took place at the Adelaide Convention Centre, Adelaide, South Australia from 4–8 November 2019. 525 registered participants took part in the conference, where there were plenary sessions as well as a wide ranging set of ten parallel tracks across all areas of work in the field and allied sciences. The conference hosted 34 plenary presentations, 370 oral presentations in parallel sessions and 131 posters.

1 Foreword

In November of 2019, the 24th International Conference on Computing in High Energy and Nuclear Physics (CHEP) was held in Adelaide, South Australia. This signified the first iteration of the conference to be hosted in Australia.

Australia is, by just about anyone’s measure of distance, a long way from everywhere else in the world. This is especially true with regards to the focal centres of the high energy and nuclear physics communities. Flying from Adelaide to CERN takes around 24 hours, with a similar time required to reach North America. Even travelling to relatively nearby Asia presents the challenge of sitting on a plane for 10 hours or more.

It was thus a great delight to welcome to Adelaide more than 540 people to participate in CHEP 2019, comprised of scientific delegates and accompanying persons. During the conference, the Adelaide weather of late spring granted long days of sunshine and a comfortable level of warmth, well before the more extreme heat of the Australian summer would commence. This yielded a pleasant atmosphere for delegates to enjoy the organised excursions, choosing to tour either the McLaren Vale wine region or Cleland Wildlife Park. After the completion of the conference, many overseas travellers visited the surrounding regions of South Australia, or journeyed interstate to explore other parts of Australia.

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Of course, at the time we did not know that for many this would be the last opportunity for international travel before world events would change everyone’s lives. With the onset of the coronavirus pandemic, 2020 presented an entirely new set of challenges to all nations. The CHEP 2019 proceedings catalogue many diverse advances in knowledge, reminding us of the value that is generated by gathering in-person for a conference. This gives all the more reason to look forward to the next face-to-face meeting of the CHEP community in Norfolk, Virginia.

2 CHEP conference series

The CHEP conference series was established in 1985, and since then has been one of the most important events in the field of computing in high-energy and nuclear physics. The conference covers a broad set of topics such as online, offline and distributed computing; software development, simulation, reconstruction and analysis packages; data handling, data bases and storage solutions; clouds, virtualisation and containers; networking and facilities, including high performance computing. It provides a valuable discussion platform, enabling the exchange of ideas between physicists, computing scientists and software engineers, as well as between renowned experts and young researchers.

Focusing on the achievements, ongoing activities, plans, and trends in the field, the CHEP conference is held every 18 months. The host location is selected on a rotating basis between the geographical regions of Europe, the Americas, and Asia Pacific. The list of past CHEP conferences is shown in Table 1.

Table 1: Dates and locations of previous CHEP conferences.

| Name   | Dates                  | Location                                      |
|--------|------------------------|-----------------------------------------------|
| CHEP’85 | 25–28 June 1985        | Amsterdam, Netherlands                        |
| CHEP’87 | 2–6 February 1987      | Asilomar, California, USA                    |
| CHEP’89 | 10–14 April 1989       | Oxford, England, United Kingdom               |
| CHEP’90 | 9–13 April 1990        | Santa Fe, New Mexico, USA                    |
| CHEP’91 | 11–15 March 1991       | Tsukuba, Japan                                |
| CHEP’92 | 21–25 September 1992   | Annecy, France                                |
| CHEP’94 | 21–27 April 1994       | San Francisco, California, USA                |
| CHEP’95 | 18–22 September 1995   | Rio de Janeiro, Brazil                        |
| CHEP’97 | 7–11 April 1997        | Berlin, Germany                               |
| CHEP’98 | 31 August–4 September 1998 | Chicago, Illinois, United States                |
| CHEP’2000 | 7–11 February 2000    | Padova, Italy                                 |
| CHEP’01 | 3–7 September 2001     | Beijing, China                                |
| CHEP’03 | 24–28 March 2003       | San Diego, California, USA                    |
| CHEP’04 | 27 September - 1 October 2004 | Interlaken, Switzerland                      |
| CHEP’06 | 13–17 February 2006    | Mumbai, India                                 |
| CHEP’07 | 2–7 September 2007     | Victoria, British Columbia, Canada            |
| CHEP’09 | 21–27 March 2009       | Prague, Czech Republic                        |
| CHEP’10 | 18–22 October 2010     | Taipei, Taiwan                                |
| CHEP’12 | 21–25 May 2012         | New York, New York, USA                       |
| CHEP’13 | 14–18 October 2013     | Amsterdam, Netherlands                        |
| CHEP’15 | 13–17 April 2015       | Okinawa, Japan                                |
| CHEP’16 | 10–14 October 2016     | San Francisco, California, USA                |
| CHEP’18 | 9–13 July 2018         | Sofia, Bulgaria                               |
3 CHEP 2019 Conference

3.1 Venue

The CHEP 2019 conference was held at the Adelaide Convention Centre (pictured below).

3.2 Conference Programme

The programme for CHEP 2019 consisted of plenary sessions and 10 parallel tracks. In the plenary sessions, 18 scientific keynote talks were given covering state-of-the-art developments in HEP (LHC Experiments, Belle II, DUNE, JUNO); other data intensive experiments and systems (SKA, gravitational waves, real-time alert systems, computational chemistry); and key technological and strategic areas (quantum computing, artificial intelligence, cyberthreats and security, European Strategy Update). In addition, two sessions were organised on diversity and inclusivity. There were 10 track highlight talks as well as a presentation from the organisers of the next face-to-face CHEP conference, which will be hosted in Norfolk, Virginia, USA.

In the parallel programme the keywords associated with Tracks 1-9 are shown in Table 2. Track X, so named for being a cross-over track and the tenth parallel track, was specially constructed from papers that had themes of common interest between Tracks 1, 2 and 9. 370 oral presentations were given in the parallel sessions. 131 posters were presented with 2 dedicated poster sessions taking place.
| Name | Keywords |
|------|----------|
| 1 Online and Real-time Computing | Data acquisition; high-level triggers; trigger-less acquisition; online data calibration; online reconstruction; machine learning for online; real-time analysis; event building; configuration and access controls; detector control systems; real-time analytics and monitoring; heterogeneous resources online; trigger techniques and algorithms; hardware trigger algorithms; online databases |
| 2 Offline Computing | Detector simulation; MC event generation; offline reconstruction; detector geometries; non-event data; data classification; fast simulation; machine learning for offline; offline databases |
| 3 Middleware and Distributed Computing | Grid middleware; monitoring and accounting frameworks; security models and tools; distributed workload management; heterogeneous resource brokering (such as GPUs); federated authentication and authorisation infrastructures; middleware databases |
| 4 Data Organisation, Management and Access | Storage management frameworks; data access protocols; object, metadata and event store systems; content delivery and caching; data analytics; machine learning for DOMA; FAIR data principles |
| 5 Software Development | Software frameworks; software management, continuous integration; software building; testing and quality assurance; software distribution; programming techniques and tools; coding for heterogeneous architectures; integration of ML and other toolkits |
| 6 Physics Analysis | Analysis algorithms; object identification; object calibration; machine learning for analysis; analysis preservation; analysis workflows; lattice QCD; theory calculations |
| 7 Facilities, Clouds and Containers | Cloud resources; virtual machines and container technologies; anything-as-a-service; private and commercial clouds; dynamic provisioning; networking; computing centre infrastructure; management and monitoring; facility integration of heterogeneous resources |
| 8 Collaboration, Education, Training and Outreach | Collaborative tools; outreach activities; training initiatives; open data for outreach; data preservation for collaboration; event displays; open science cloud initiatives |
| 9 Exascale Science | HPC and supercomputers; algorithm scaling; computing models; exabyte; exaflop; compute accelerators; generic algorithms; weak scaling; quantum computing; massive scale machine learning |
| X Crossover sessions from online, offline and exascale | Selected contributions that were identified as of common interest, touching topics between online, offline and exascale computing (Tracks 1, 2 and 9) |
3.3 Programme Committee

The CHEP 2019 Programme Committee (PC) developed the parallel sessions with appointed track conveners, who provided their expertise to review the papers submitted to the conference. The plenary programme was defined by the conference and PC chairs, in consultation with the International Advisory Committee (IAC). The PC members are listed in Table 3.

Table 3: CHEP 2019 Programme Committee

| Name                                      | Affiliation                      |
|-------------------------------------------|----------------------------------|
| Alessandra Forti                         | Manchester                      |
| Brian Paul Bockelman                     | Morgridge Institute for Research |
| Caterina Doglioni (PC Co-chair)          | Lund                             |
| Catherine Biscarat                       | CNRS/IN2P3                      |
| Chiara Rovelli                           | INFN Roma                       |
| Christoph Wissing                        | DESY                             |
| Christopher Pinkenburg                   | BNL                              |
| Chunhua Li                               | LiaoNing Normal University      |
| Clara Nellist                            | Göttingen                       |
| Dimitri Arkhipkin                        | BNL                              |
| Doris Kim (PC Co-chair)                  | Soongsil                        |
| Fabio Hernandez                          | CC-IN2P3                        |
| Felice Pantaleo                          | CERN                             |
| Graeme A Stewart (PC Co-chair)           | CERN                             |
| Ilya Komarov                             | DESY                             |
| Isabel Campos Plasencia                  | CSIC                             |
| James Letts                              | UCSD                             |
| Jennifer Ngadiuba                        | CERN                             |
| Juan Guzman                              | CSIRO                            |
| Lauren Tompkins                          | Stanford                         |
| Lucia Silvestris (PC Co-chair)           | INFN Bari                       |
| Martin Ritter                            | LMU München                      |
| Marzena Lapka                            | CERN                             |
| Maurizio Pierini                         | CERN                             |
| Mihaela Gheata                           | Institute of Space Science       |
| Oksana Shadura                           | Nebraska-Lincoln                 |
| Paul Laycock                             | BNL                              |
| Phiala Shanahan                          | MIT                              |
| Sang-Un Ahn                              | KISTI                            |
| Soňa Vallecorsa                          | CERN                             |
| Stefan Roiser                            | CERN                             |
| Steven Farrell                           | NERSC                            |
| Steven Schramm                           | Geneva                           |
| Teng Jian Khoo                           | Geneva                           |
| Tibor Šimko                              | CERN                             |
| Tigran Mkrtchyan                          | DESY                             |
| Tomoe Kishimoto                          | Tokyo                            |
| Wei Yang                                 | SLAC                             |
| Xavier Espinal                           | CERN                             |
| Yu Nakahama Higuchi                      | Nagoya                           |
3.4 International Advisory Committee

The CHEP 2019 International Advisory Committee provided essential strategic advice for the organisation of the event and the members of the IAC are listed in Table 4. The CHEP 2019 IAC met 12 times, including one meeting held after the conference itself.

Table 4: CHEP 2019 International Advisory Committee

| Name                                      | Affiliation                  |
|-------------------------------------------|------------------------------|
| Alessandra Forti                          | Manchester                  |
| Amber Boehnlein                           | JLab                         |
| Andreas Wicenec                           | UWA/ICRAR                    |
| Concezio Bozzi                           | INFN Ferrara                 |
| David Britton                             | Glasgow                      |
| David Groep                               | Nikhef                       |
| Davide Costanzo                           | Sheffield                    |
| Caterina Doglioni (PC Co-chair)           | Lund                         |
| Doris Kim (PC Co-chair)                   | Soongsil                     |
| Elizabeth Sexton-Kennedy                  | FNAL                         |
| Gang Chen                                 | IHEP                         |
| Ghita Rahal                               | CC-IN2P3                     |
| Gonzalo Merino                            | Wisconsin                    |
| Gordon Watts                              | Washington                   |
| Graeme A Stewart (PC Co-chair)            | CERN                         |
| Hannah Short                              | CERN                         |
| Heather Gray                              | UC Berkeley/LBNL             |
| Ian Bird                                  | CERN                         |
| Ikuo Ueda                                 | KEK                          |
| Jerome Lauret                             | BNL                          |
| Josep Flix                                | PIC/CIEMAT                   |
| Julia Andreeva                            | CERN                         |
| Latchezar Betev                           | CERN                         |
| Lucia Silvestris (PC Co-chair)            | INFN Bari                    |
| Maarten Litmaath                          | CERN                         |
| Marco Cattaneo                            | CERN                         |
| Maria Girone                              | CERN                         |
| Markus Klute                              | MIT                          |
| Michel Jouvin                             | IN2P3 - Orsay                |
| Michel Vetterli                           | Simon Fraser/TRIUMF           |
| Minh Huynh                                | UWA/ICRAR-CSIRO              |
| Mohammad Al-Turany                        | GSI                          |
| Niko Neufeld                              | CERN                         |
| Oxana Smirnova                            | Lund                         |
| Patrick Fuhrmann                          | DESY                         |
| Peter Clarke                              | Edinburgh                    |
| Peter Elmer                               | Princeton                    |
| Peter Hristov                             | CERN                         |
| Petya Vasileva                            | CERN                         |
| Randall Sobie                             | Victoria                     |
| Richard Mount                             | SLAC                         |
Table 4: CHEP 2019 International Advisory Committee

| Name                  | Affiliation     |
|-----------------------|-----------------|
| Sang Un Ahn           | KISTI           |
| Simon Lin             | Academia Sinica|
| Simone Campana        | CERN            |
| Takanori Hara         | KEK             |
| Tommaso Boccali       | INFN Pisa       |
| Torre Wenaus          | BNL             |
| Vasil Georgiev Vasilev| Princeton       |
| Wahid Bhimji          | NERSC/LBNL      |
| Xiaomei Zhang         | IHEP            |

3.5 Local Organisation

The CHEP 2019 conference was chaired by Paul Jackson and Waseem Kamleh. The chairs wish to thank the secretariat, Sharon Johnson and Silvana Santucci, for their tremendous work in ensuring the organisation of the conference ran smoothly. Valuable assistance was provided by the members of the local organising committee, listed in Table 5.

Table 5: CHEP 2019 Local Organising Committee

| Name                  | Affiliation     |
|-----------------------|-----------------|
| Anthony Thomas        | Adelaide        |
| Anthony Williams      | Adelaide        |
| Derek Leinweber       | Adelaide        |
| Jacinda Ginges        | UQ              |
| James Zanotti         | Adelaide        |
| Martin Sevior         | Melbourne       |
| Martin White          | Adelaide        |
| Paul Jackson (co-chair)| Adelaide      |
| Peter Skands          | Monash          |
| Ross Young            | Adelaide        |
| Waseem Kamleh (co-chair)| Adelaide     |

3.6 Proceedings Reviewers

In addition to the programme committee members, listed in Table 3, we are very grateful to many members of the HEP community who helped review the papers that were submitted to this issue of the proceedings. The full list of reviewers is: Alaettin Serhan Mete, Alessandra Forti, Alex Martyniuk, Amol Jaikar, Andrea Perrotta, Andrea Sciabà, Andreas Gellrich, Andrzej Bożek, Anna Sfyrla, Antonio Di Pilato, Antonio Pérez-Calero Yzquierdo, Archana Sharma, Aristidis Fkiaras, Arturo Sánchez, Attila Krasznahorkay, Bokrae Jung, Brian Bockelman, Byunghun Kong, Carlos Lourenco, Caterina Doglioni, Catrin Bernius, Cecilia Uribe Estrada, Chiara Rovelli, Christian Voss, Christoph Wissing, Christophe Haen, Christopher Pinkenburg, Christos Leonidopoulos, Chunhua Li, Clara Nel-list, Concezio Bozzi, Costin Grigoras, Daniel Hackett, David Bouvet, David Lange, David Rohr, Diego Davila Foyo, Diogo Castro, Dmitri Smirnov, Dimitri Arkhipkin, Doris Yang-soo Kim, Dorothea Vom Bruch, Edgar Fajardo, Eileen Kuehn, Enric Tejedor, Fabio Cossutti,
Sponsors

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