

CHEP 2021: Preface to the Proceedings

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Abstract. The 25th International Conference on Computing in High Energy and Nuclear Physics (CHEP), organised by CERN, took place as a *virtual* event from 17–21 May 2021. The conference attracted 1144 registered participants from 46 different countries. There were 207 scientific presentations made over the 5 days of the conference. These were divided between 30 long talks and 2 keynotes, which were presented in plenary sessions; and 175 short talks, which were presented in parallel sessions.

1 Foreword

In May 2021 the 25th International Conference on Computing in High Energy and Nuclear Physics (CHEP) was held. Since the last CHEP in Adelaide (November 2019), the world has been in the grip of the Covid-19 pandemic, which meant that the intended 2021 conference in Norfolk, Virginia, had to be postponed. Therefore, in late 2020, with the support of the CHEP International Advisory Committee, CERN agreed to organise a virtual edition of CHEP (*vCHEP*), to afford the software and computing communities of nuclear and high energy physics (NHEP) the chance to present and publish their work.

The organisation of CHEP as a virtual event was quite a different challenge from that associated with a face-to-face CHEP so a number of important changes were made. Instead of a short abstract, submissions to the conference were full draft papers. While this is common practice in other fields it was the first time that this had been tried in this branch of NHEP. The authors of papers were asked to concentrate on specific areas of novel research and development and to identify a particular technological *theme* for their work, rather than organising by traditional CHEP tracks.

Despite the challenge of front-loading the work in submissions, more than 200 papers were received, underlining the appetite of researchers to participate in a CHEP, even one that was hosted virtually.

The full papers allowed the organisers to select a plenary programme that was based on the work submitted to the conference, rather than the normal plenary program of invited

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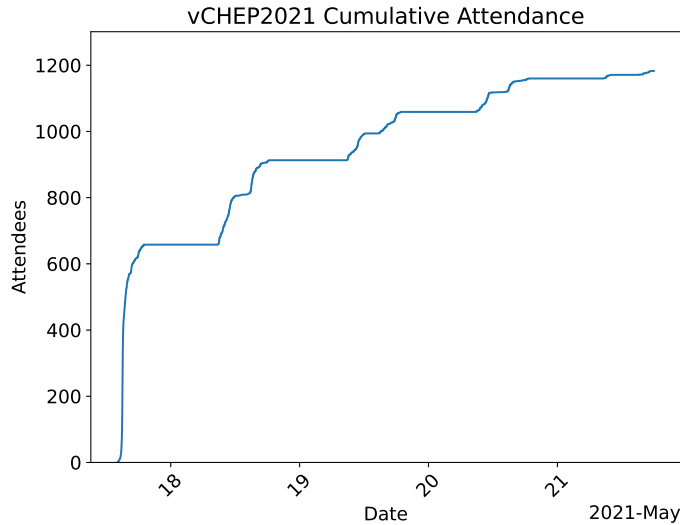


Figure 1. vCHEP cumulative attendance.

speakers, many from outside NHEP. This gave a unique focus to vCHEP, highlighting the excellent on-going work to tackle the upcoming challenges in the field.

In addition to the plenary programme, a number of parallel sessions were organised, which focused on particular technological themes, thus attracting a diverse set of papers from different parts of the NHEP workflow and being complimentary to a more traditional track-based organisation.

As a virtual event, vCHEP had to strive for a schedule that would allow for participation from across the world – vCHEP was a truly global affair with participants from 46 countries and spanning 20 hours of timezones, from Brisbane (UTC+10) to Honolulu (UTC-10). The solution adopted was to have “morning” sessions (at least in the CERN timezone), adapted to Europe and Asia-Pacific, a long break, then “afternoon” sessions, adapted for Europe and the Americas. As it was clearly impossible to present at any time that was suitable for all participants, every talk was recorded and these were made available a few hours after the presentations and have also been archived via the [conference website](#).

In addition to providing the live video conferencing sessions and the video recordings, for the first time at CHEP, a chat system was employed that allowed participants to continue discussions of papers offline, including from incompatible timezones.

As we have learned since the start of the pandemic, virtual events are treated as more of a buffet than a banquet, with participants free to join only the sessions that interest them. However, in total vCHEP recorded a cumulative participation of 1182 unique connections and largest single-session attendance of 496 people (Figure 1).

In addition to these conference proceedings a number of vCHEP papers are being prepared for fully-refereed publication in *Computing and Software for Big Science* (Springer), which has been appreciated as an option for the most outstanding contributions.

vCHEP was a success and exceeded the organisers and the IAC’s expectations for an event restricted to be held virtually. However, we recognise that not all of the value of a normal CHEP could be offered at this exceptional vCHEP – the informal and face-to-face interactions, so valued by all of us, were missing. Therefore we hope very much that the next

edition of CHEP, the re-scheduled event in Norfolk, Virginia, in May 2022, will see a return to a format that allows this very important aspect of the CHEP series to happen again.

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, databases and storage solutions; clouds, virtualisation and containers; networking and facilities, including high performance computing. This year, for the first time, a parallel session on quantum computing was organised. 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.

The CHEP conference is normally 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 intention for the 25th CHEP was to hold it in Norfolk, Virginia, USA. However, the global pandemic forced the plans for such a CHEP, with a traditional format, to be postponed for 12 months. The CHEP International Advisory Committee considered that a gap of 30 months between CHEPs was too long and would lose momentum for the conference series and lose a valuable opportunity for the community to present and discuss work, particularly for early career researchers. Bids were invited to organise an exceptional virtual edition of CHEP, and an offer from CERN to organise vCHEP was accepted.

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
CHEP2000	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



Figure 2. The vCHEP 2021 conference photo.

Table 1: Dates and locations of previous CHEP conferences.

Name	Dates	Location
CHEP'18	9–13 July 2018	Sofia, Bulgaria
CHEP'19	4–8 November 2019	Adelaide, Australia

The (virtual) conference photograph for vCHEP 2021 is shown in Figure 2.

3 CHEP 2021 Conference

3.1 Conference Programme

In contradistinction to the usual process at CHEP, where a short abstract is submitted, usually to a specific parallel session track, for vCHEP authors were asked to submit a full draft paper of 6–10 pages. Despite the short timescale for writing such papers (barely three months between the call and the close of submissions, including the need for some experiment reviews), more than 200 papers were received.

When submitting, the number of traditional tracks was pared down from previous CHEPs to just four: Offline Computing; Distributed Computing, Data Management and Facilities; Online Computing; Collaboration, Education, Training and Outreach. The distribution of papers against these tracks is shown in Figure 3.

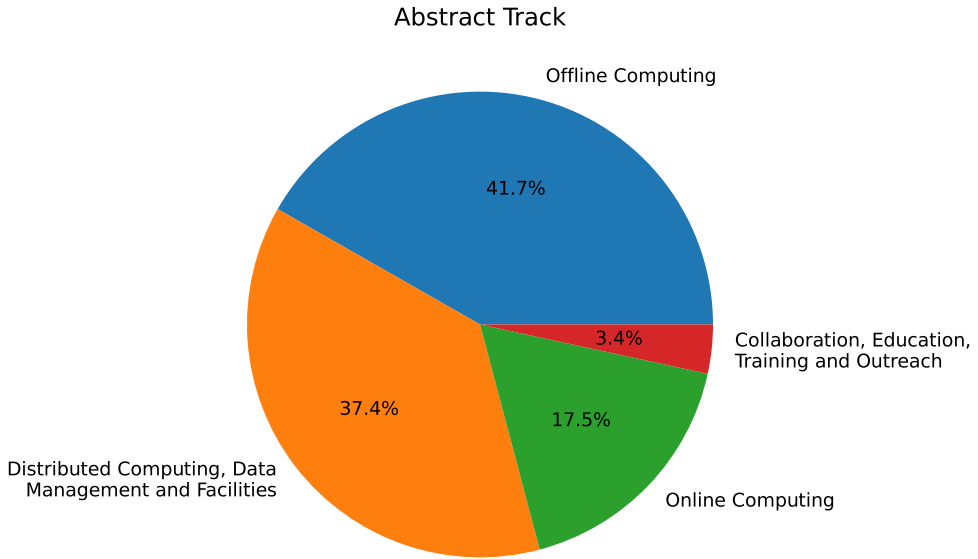


Figure 3. vCHEP paper submissions by track.

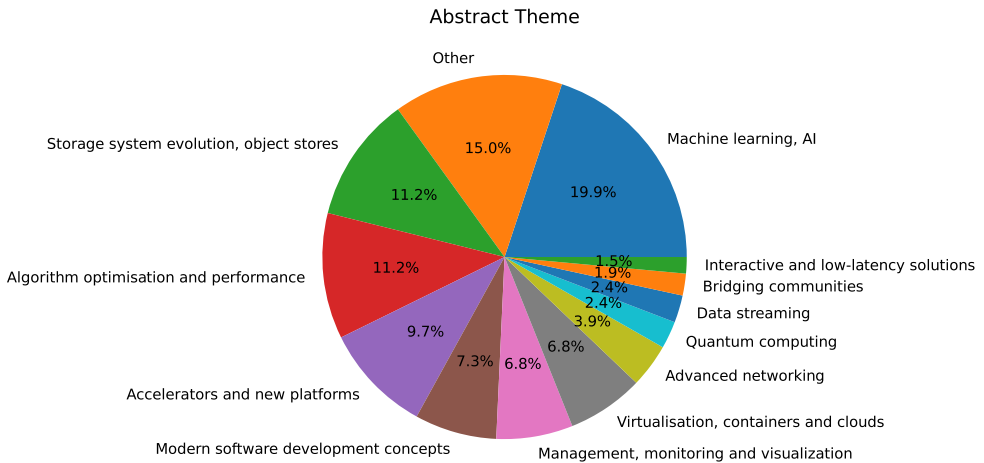


Figure 4. vCHEP paper submissions by themes.

In addition, authors could highlight a particular theme, which were organised on a more technological basis, that helped identify common trends in an orthogonal way to the tracks. The distribution of papers against themes is shown in Figure 4.

Due to the special nature of vCHEP it was decided that the plenary programme would be formed principally of the most innovative papers from the NHEP field itself. Thirty papers were selected from the submissions to form the plenary programme, from across all of

the topics that were submitted. In addition, two keynotes were invited in order to give an overview of the computing and software domains in NHEP, which set the stage for the rest of the conference.

When organising the parallel sessions themes were chosen as the organising principle, to draw connections between areas that would not normally be grouped when organising by track. Of particular note is that at vCHEP the first parallel session on Quantum Computing was organised for the CHEP series.

3.2 Programme Committee

The CHEP 2021 Programme Committee (PC) members were charged with reviewing the submissions to vCHEP and providing feedback to the authors for preparing the final versions. We would like to thank them particularly for the work they managed to do in reviewing full papers on a very short timescale. The Programme Committee also helped to chair the parallel sessions.

The selection of papers for the plenary session was managed by the Conference and Programme Committee Chairs, based on inputs from the Programme Committee reviews.

The PC members are listed in Table 2.

Table 2: CHEP 2021 Programme Committee

Name	Affiliation
Agnieszka Dziurda	Polish Academy of Sciences
Andrea Formica	Université Paris-Saclay
Andrea Sartirana	CNRS/IN2P3
Andrea Sciaba	CERN
Ben Couturier	CERN
Benjamin Krikler	Bristol
Benedikt Hegner (PC Co-chair)	CERN
Caterina Doglioni	Lund
Catherine Biscarat (PC Co-chair)	L2I - Toulouse, CNRS / Univ. Paul Sabatier
Chiara Rovelli (PC Co-chair)	INFN Roma
Cedric Serfon	BNL
Christophe Haen	CERN
Clara Gaspar	CERN
Clara Nellist	NIKHEF
Daniela Bauer	Imperial London
Daniele Spiga	INFN Perugia
Dave Britton	Glasgow
David Bouvet	CNRS/CC-IN2P3
David Crooks	RAL
David Rohr	CERN
Dirk Duellmann	CERN
Dmytro Kresan	GSI
Dorothea vom Bruch	CNRS/CPPM
Edoardo Martelli	CERN
Eduardo Rodrigues	Liverpool
Elizabeth Sexton-Kennedy	FNAL
Enrico Guiraud	CERN
Eric Yen	ASGC

Table 2: CHEP 2021 Programme Committee

Name	Affiliation
Felice Pantaleo	CERN
Ghita Rahal	CNRS/CC-IN2P3
Gian Michele Innocenti	CERN
Giulio Eulisse	CERN
Gonzalo Merino Arevalo	PIC
Gordon Watts	Washington
Graeme A Stewart	CERN
Jason Webb	BNL
Jerome Lauret	BNL
John Chapman	Cambridge
Joosep Pata	NICPB Estonia
Julia Andreeva	CERN
Katy Ellis	RAL
Latchezar Betev	CERN
Luisa Arrabito	CNRS/IN2P3
Maarten Litmaath	CERN
Marc Dunser	CERN
Maria Girone	CERN
Markus Schulz	CERN
Marzena Lapka	CERN
Niko Neufeld	CERN
Peter Clarke	Edinburgh
Peter Hristov	CERN
Reda Tafirout	TRIUMF
Shawn McKee	Michigan
Simon George	RHUL
Simone Campana	CERN
Simone Pigazzini	ETH
Sofia Vallecorsa	CERN
Stefan Roiser (PC Co-chair)	CERN
Steve Timm	FNAL
Stewart Martin-Haugh	RAL
Takanori Hara	KEK
Teng Jian Khoo	Humboldt
Tommaso Boccali	INFN Pisa
Tomoe Kishimoto	Tokyo
Vardan Gyurjyan	JLab
Xavier Espinal	CERN
Yuji Kato	Nagoya

3.3 International Advisory Committee

The CHEP 2021 International Advisory Committee provided essential strategic advice for the organisation of the event and helped to run the plenary sessions. The members of the IAC are listed in Table 3. The CHEP 2021 IAC met six times, including one meeting held after the conference itself.

Table 3: CHEP 2021 International Advisory Committee

Name	Affiliation
Alessandra Forti	Manchester
Amber Boehnlein	JLab
Andreas Wicenc	UWA/ICRAR
Benedikt Hegner (PC Co-chair)	CERN
Bronson E Messer II	ORNL
Caterina Doglioni	Lund
Catherine Biscarat (PC Co-chair)	L2I - Toulouse, CNRS / Univ. Paul Sabatier
Chiara Rovelli (PC Co-chair)	INFN Roma
Chris Cuevas	JLab
Concezio Bozzi	INFN Ferrara
Danilo Piparo	CERN
David Britton	Glasgow
David Groep	NIKHEF
Doris Kim	Soongsil
Elizabeth Sexton-Kennedy	FNAL
Eric Yen	ASGC
Gang Chen	IHEP
Ghita Rahal	CNRS/CC-IN2P3
Gonzalo Merino Arevalo	PIC
Gordon Watts	Washington
Graeme A Stewart (Conference Co-chair)	CERN
Graham Heyes	JLab
Hannah Short	CERN
Heather Gray	LBNL
Heidi Schellman	Oregon
Ian Bird	CERN
Ikuo Ueda	KEK
James Catmore	Oslo
Jerome Lauret	BNL
Julia Andreeva	CERN
Latchezar Betev	CERN
Lucia Silvestris	INFN Bari
Marco Cattaneo	CERN
Maria Girone	CERN
Michel Jouvin	IJCLab
Mohammad Al-Turany	GSI
Niko Neufeld	CERN
Oxana Smirnova	Lund
Pat Scott	Queensland
Patrick Fuhrmann	DESY
Paul Jackson	Adelaide
Paul Laycock	BNL
Pere Mato Vila	CERN
Peter Clarke	Edinburgh
Peter Elmer	Princeton
Peter Hristov	CERN
Raffaella Devita	JLab

Table 3: CHEP 2021 International Advisory Committee

Name	Affiliation
Randy Sobie	Victoria
Reda Tafirout	TRIUMF
Richard Mount	SLAC
Sang-Un Ahn	KISTI
Simone Campana (Conference Co-chair)	CERN
Stefan Roiser (PC Co-chair)	CERN
Stefano Piano	INFN Trieste
Takanori Hara	KEK
Tommaso Boccali	INFN Pisa
Torre Wenaus	BNL
Waseem Kamleh	Adelaide

3.4 Local Organisation

The CHEP 2021 conference was chaired by Simone Campana and Graeme A Stewart. The chairs wish to thank the secretariat, Catherine Noble, for her tremendous work in ensuring the organisation of the conference ran smoothly. As a virtual conference we needed to have excellent IT support for running the conference website, managing submissions, hosting sessions, handling videos, etc. For this, invaluable assistance was provided by the members of the local organising committee, listed in Table 4.

Table 4: CHEP 2021 Local Organising Committee

Name	Affiliation
Simone Campana (Conference Co-chair)	CERN
Graeme A Stewart (Conference Co-chair)	CERN
Catharine Noble (Secretariat)	CERN
Hanna Short	CERN
Helge Meinhard	CERN
Latchezar Betev	CERN
Maria Girone	CERN
Markus Elsing	CERN
Melissa Gaillard	CERN
Peter Hristov	CERN
Sebastian Lopienski	CERN
Thomas Baron	CERN
Adeel Ahmad	CERN
Julia Andreeva	CERN
Xavier Espinal	CERN
Eric Grancher	CERN
Viktor Khristenko	CERN
Maarten Litmaath	CERN
Edoardo Martelli	CERN
David Southwick	CERN
Eric Wulff	CERN
Anirudh Goel	CERN
Katarzyna Dzedziniewicz	CERN

4 Acknowledgements

The organisers would like to acknowledge the strong support of the CERN directorate for CHEP 2021. This allowed us to run a very successfully event, at no cost to participants, and to publish the proceedings and CSBS articles, at no cost to the authors.

