Sustainable HEP

Monday, 28 June 2021 - Wednesday, 30 June 2021

Zoom

Book of Abstracts

Contents

Flash Talk / 2

Remote teaching and collaboration using MathPump and SVGServer

Author: Andrey Mikhaylov[1]

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I will share my experience with remote interaction techniques bases on exchange of patches to SVG files. Advantages and disadvantages comparing with alternative methods (Zoom, Google Talk) will be discussed.

Flash Talk / 3

Science and activism

Author: Tomas Kasemets[1]

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I would like to give a Flash Talk to start a discussion on the responsibility of scientists in the society. Can and should serious scientific work be combined with activism? What are the dangers and advantages? How to deal with a situation where the gap between what scientifically makes sense and the political norm is growing. The talk should stimulate discussion rather than provide answers, and will be based on personal thoughts.

Flash Talk / 4

ATLAS Open Data and the mission of developing educational resources that run ”everywhere”

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The ATLAS Open Data project for education aims to deliver reliable and easy-to-setup resources for teaching High Energy Physics and the related computer sciences. Because of the worldwide nature of our target audience, university students and their trainers, this requires building resources on top of open-source tools that allow others to use them freely and to contribute to their development. We present how the usage of very well-known open-access technologies combined with the knowledge of the ATLAS outreach group is enhancing the overall project towards a more collaborative dynamic, proper of an open-source project. When also ensuring that such resources are used in as many places, individual computers and modest academic institutions as possible.

Flash Talk / 5

Paradigm shift or minor adjustments? A short overview of scientific meetings in the post-pandemic era

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Covid-19 pandemic has had a tremendous impact on every aspect of our society. As scientists, we had to adapt to the new reality in an instant. Considering academia has deeply rooted traditions and prescribed formulae on how certain things are done, we were and still are faced with challenges of everyday work life. Conferences and workshops, being one important facet of the scientific job, are now more often than not turned into a never-ending Zoom meeting with the traditional format being forced into a new virtual environment. The general consensus is that everyone is very eager to go back to the "old normal"where we travel to conferences and "business is as usual"and that "f2f" meetings are better than the virtual ones. My opinion on that matter is very different. I can offer a unique perspective both as an attendee and as a scientific conference organizer (Cosmology from Home). In this presentation I would like to talk about what I think each conference format lacks, what are the benefits and offer ideas on how we can improve and solve the problems we are faced with.

Flash Talk / 6

A Solar Bridge for Research Infrastructures

Authors: Michael Johannes Dueren[1]; Johannes Hampp[2]

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Global, international cooperation is the basis of our large-scale HEP facilities and already at times of the cold war the HEP community was able to foster international cooperation also in political areas far beyond physics. Gerhard Knies, a former physicist at DESY, applied the HEP- community' s spirit of cooperation to the renewable energy sector in 2009, when he initiated the DESERTEC foundation. Today, this idea is still a valid option to provide low-cost sustainable power for future research facilities.

His aim was to transfer the knowledge and the financial power of the industrial countries to the sunbelt of North Africa to produce solar power at large scale. In return, North Africa was prepared to sell low-cost renewable power to Europe transmitted by High Voltage Direct Current (HVDC) lines. It was thought as a win-win concept on many levels, not only in the areas of energy and environment, but especially as incentive to the African countries to reduce the gradient of wealth and the pressure for migration by providing new jobs and perspectives to their young generation [1,2].

Today, 12 years later, the DESERTEC idea has sprouted into many individual projects worldwide. Next to electricity many different forms of energy export including prominently "green"hydrogen are aimed for. For short and medium distances, the direct cable connection (HVDC) still remains the most efficient and economic option for power transfer. Renewable solar and wind power generation is booming in North African and Arabian Countries [3,4]. However, large scale power transfer across continental borders is still in its infancy. The reason for the reluctance of investors are political difficulties, the requirement of multinational contracts and the chicken and egg problem: Transmission lines for export will only be built where sufficient power generators for supply as well as demand are ensured –and vice versa.

To get over the chicken and egg problem we propose that the HEP community initiates a HVDC line from North Africa to the European Grid, e.g. from Tunisia to Italy or from Morocco to Spain,

so that European Large Scale Infrastructures (including possibly also smaller research centers and universities) can profit from low-priced African solar power. We believe that the community, especially CERN, has sufficient political connections to convince its member and associated member states to proceed with such a cable. In recent years the SESAME light source in Jordan [5] is an excellent modern example not only for powering an accelerator infrastructure with solar power, but more importantly, that the HEP community was able to convince the political leaders to leave deadlocked historical paths behind and take innovative and cooperative directions into a future of cooperation.

References:
[1] Michael Düren, Understanding the Bigger Energy Picture - DESERTEC and Beyond, SpringerBriefs in Energy (2017), https://doi.org/10.1007/978-3-319-57966-5
[2] Michael Düren, Review: Clean Power from Deserts, Green, Vol. 1 (2011), pp. 263–275, https://doi.org/10.1007/978-3-319-57966-5
[3] Saudi-Arabien plant größtes Solarkraftwerk der Welt, ingenieur.de, https://www.ingenieur.de/technik/fachbereiche/energie/saudi-arabien-plant-groesstes-solarkraftwerk-der-welt/
[4] Abu Dhabi To Have Cheapest Solar Power Ever —1.35 Cents Per Kilowatt-HourClean Technica, May 2020, https://cleantechnica.com/2020/05/06/abu-dhabi-will-have-the-cheapest-solar-farm-ever-built/
[5] CERN COURIER, "A recipe for sustainable particle physics"11 March 2020, https://cerncourier.com/a/a-recipe-for-sustainable-particle-physics/

Flash Talk / **7**

The remote monitor and control systems of the PADME experiment at the DAΦNE BTF

Authors: Emanuele Leonardi[1]; Fabio Ferrarotto[1]; Alessandro Ruggieri[1]; Simeon Ivanov[2]; Svetoslav Ivanov[2]

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A possible Dark Matter model postulates that it interacts with Standard Model particles only through a massive photon-like vector particle, called dark photon or A'. The PADME experiment at the DAFNE Beam-Test Facility (BTF) of the INFN Frascati National Laboratory (LNF) is designed to detect dark photons produced in positron on fixed target annihilations decaying to dark matter (e+e- → gamma A') by measuring the final state missing mass. A first period of data acquisition, Run 1, took place between 2018 and 2019 while a second period, Run 2, was foreseen for the first half of 2020. Due to the COVID-19 pandemics, which delayed several in-situ activities at LNF, Run 2 was postponed to the second half of 2020. One of the problems facing the collaboration in this period was the impossibility of traveling to the LNF site for the shifters required for the experimental run. This talk describes how the experiment monitor and control systems were successfully adapted to be operated from remote locations, greatly reducing the need for local interventions. Run 2 lasted from July to December 2020 and collected O(5x10^12) positrons-on-target interactions.

Flash Talk / **8**

A solar powered CERN

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The necessary reduction of CO 2 emissions will not only require greener electricty production, but will also increase the demand for electricity. Using yearly a TWh of electricity to run an accelerator (as FCC-ee) will be increasingly hard to justify to the public and policy makers. How much can CERN produce on its own with an aggressive solar-panel deployment strategy? I'll give a few examples based on tools provided by Canton Geneva and Swiss Department of Energy.

Flash Talk / 9

Quantum Gravity Across Approaches - A virtual seminar series

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Even outside of pandemic circumstances, a virtual seminar series can offer the opportunity to connect a broader community that one might not reach through a conference. Quantum Gravity Across approaches is such a seminar series.
The seminar series is organized by Sebastian Fischetti, Aaron Held, Sebastian Steinhaus and myself, each of us coming from a different direction of Quantum Gravity. We started planning the seminar series late in 2019, and were always planning to keep it a virtual series. Our seminar series, with the first talk happening in autumn 2020, attempts to foster discussion and interaction between disjoint communities working on similar questions.

In this talk you'll find out what we thought about, how we planned and organized, and what we are thinking now after the first series is over, and as we are planning the 2nd one.

Flash Talk / 10

Working Online and Offline: A Vision of Diversity

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Due to the pandemic, we have experienced two very different modes of working in the past 2 years: A primacy of offline interactions before it and nearly-exclusive online communication during it. This leads to a question about how professional cooperation will be organized in the future. I will argue that we should strive for a diversity of answers, where the proportion of online vs. offline work varies significantly both within and between research teams. This does not only offer a great opportunity to reduce the amount of daily travel, but it can also make a university career more attractive for social groups that have often been dissuaded by employment conditions, such as parents, dual career relationships and scientists with disabilities. Since in my opinion academia is uniquely suited for flexible work forms, it can in this way serve as a role model for other professional sectors. Finally, I shall discuss concrete approaches to achieve efficient communication and team building even if a majority of interactions takes places online.

Flash Talk / 11

Towards constructing interactive virtual spaces

Authors: Cem Eröncel[1]; Gizem Şengör[2]; Ceyda Şimşek[3]; Beyzanur Aka[4]; Can Yürekli[4]; Muhammed Zeki Şentürk[4]

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Over the past year, many of us have experienced positive and negative sides of online conferences. A big challenge of online platforms is in hosting a venue for further discussions on the spot among participants. In this talk, we would like to share our experience in architecting an online environment to accommodate this while trying to bring online one of the long-run semiannual Physics student events in Turkey. In bringing coffee breaks and spontaneous discussions online, we will discuss the features we chose to focus on and our attempts at realizing them virtually. The result we had was quite successful and led to a longer-lasting and dynamic venue for discussions than the range of conversations in face-to-face conferences we had experienced before. We will end the talk by focusing on the further inclusivity of researchers from socioeconomically disadvantaged regions that online conferences make possible and resolutions for face-to-face conferences to ease the main challenges in this respect.

Flash Talk / **12**

Discussions on Diversity – an academic approach

Author: Ayan Paul[1]

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Awareness of diversity goes beyond simply following the regulations set down at institutions. The collective mindset that drives the lack of diversity must be carefully examined and addressed. In this flash talk, I would like to discuss a concept of taking the academic route by organizing discussion sessions around journal articles written on diversity in academia. At DESY, we have experimented with this and uncovered some useful ideas that we would like to share with the community with the hope that others find them useful too.

Flash Talk / **13**

Feedback on GatherTown: a tool to make virual conferences more convivial

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In a world with zero net carbon emission (hopefully in 2050), it will be likely conferences will be more often virtual. However virtual conferences have the main drawback to lack of conviviality, and informal discussions that turn out often fruitful.
In March 2021, GatherTown software has been tested during a virtual national workshop. We will present the outcome of this experience, that allowed to have more informal discussions.

Flash Talk / 15

The lawphysics initiative as a tool to communicate research in physics

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The way of sharing information between scientists has changed from personal letters to live-streaming of breakthroughs, as it occurred with the announcements of the Higgs discovery or with the gravitational wave detection. In 2015, the Latin American Webinars on Physics (lawphysics) was created by postdocs and PhDs from Latin America but dispersed across the world. This is a webinar cycle oriented to physicists and science enthusiasts, which covers the topics related to high energy physics, astroparticle physics, astrophysics and cosmology. Lawphysics typically hosts two or three webinar sessions per month, which for over five years has archived an average of 300 views per talk. In this talk, We present an overview of lawphysics, including its goals and status, and an analysis of its impact after more than a hundred webinars. We will additionally offer recommendations for how to host live webinars and about ways to offer opportunities for students in developing countries to hear a cutting-edge research talk and being able to interact with the speakers.

Flash Talk / 17

Software Training and Sustainable HEP

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The long-term sustainability of the research software ecosystem is particularly important for HEP, given that the HL-LHC and other facilities of the 2020s will be relevant through at least the 2030s. To prepare a workforce that meets our software challenges, the HSF along with its partners: IRIS-HEP, FIRST-HEP and the Carpentries has implemented a vision of software training with a focus on scalability and sustainability. We have built a strong, motivated and diverse community that voluntarily supports building and teaching of software material. In this way, around 1000 people were trained in the last two years. While initial training was an in-class experience, we quickly adapted to the COVID-19 pandemic by changing to an online training model. In this contribution we describe our experience and how it has actually made our reach more broader, more diverse and more sustainable.

Flash Talk / 18

A year on zoom: making use of the unique opportunity

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- What are the advantages, challenges, and opportunities of online meetings?
- How did online seminars, workshops, and conferences change as we grew accustomed to them?
- How can we make online meetings an attractive alternative to (complement) in-person meetings?

Having had the opportunity to co-organize multiple online meetings – from established skype-seminars that took place online long before the pandemic to novel online-workshop formats – these are my (very personal) reflections about one year of academic life online.

Flash Talk / 19

Reducing travel with online events: RemotelyGreen

Author: Benjamin Krikler[1]

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Do we need to travel to support international collaboration? If the last year has shown us anything, the short answer seems to be no but with room for improvement. RemotelyGreen is a hybrid organisation with its roots in a series of Geneva-based hackathons back in 2019, before the pandemic. Its vision is to see remote collaboration be the norm, even in a post-COVID world, given it can reduce accessibility barriers and be far more environmentally friendly. We've been working on several fronts: an open-source carbon calculator to allow people to compare online events to in-person ones on an equal footing, and a platform to make it easier to meet new people at online events. Over the last year we've helped dozens of big events go online and seen what works and what doesn't. In this talk I'll give an overview of all that we've been doing, what we've learnt, and where we seem to be going.

Flash Talk / 20

Reducing travel: The need to go online and how to deal with this

Authors: Kristin Lohwasser[1]; Jordan Fisher[1]

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The reality of large international conferences is that they pose a considerable risk to the environment. This is a long recognised fact [Reay2003], yet until 2020 little has been done specifically for conferences. The carbon footprint per paper was estimated by one study to be 801kg of CO_2 [Spinellis 2013], this is obviously not an insignificant amount and thus efforts and techniques to make conferences more environmentally friendly should be an important consideration now and into the future. Whilst the internet of course is not a carbon-free entity, it is far better than hundreds of attendees flying in across the world. Increased virtual presence of a conference can help to reduce travel, along with other potential implementations [Hamant2019].
The COVID-19 crisis has resulted in a boom for virtual conference which allowed to play with the

format and to understand Pros and Cons. A general review of formats, problems and achievements as well as possible future improvements will be given.

Flash Talk / 22

What is a conference?

Authors: Niels Van Bakel[1]; Auke-Pieter Colijn[1]; Rasa Muller[2]; Martijn van Calmthout[3]

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We propose a fundamental change to the way we organize conferences. Covid taught us that we can interact effectively online, but covid also taught us that meeting in person is crucial. We see a future in which large conferences like ICHEP are organized differently, in a way that stimulates high-quality content, facilitates person-to-person contact while significantly reducing the environmental impact.

Flash Talk / 23

Is sustainable HEP possible? The answer's probably no.

Authors: Emma McKay[None]; Hannah Wakeling[None]

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We are all here for a sustainable HEP. But what does sustainability mean? It does not mean less carbon emitted—it means a genuinely circular way of living in the world. HEP depends on complex computing infrastructure and large devices which are made of metal mined from the earth that cannot always be recycled. All HEP infrastructure emits carbon. Climate change is urgent. Is particle physics?

Particle physics might not be ending any time soon. What can be done to make it circular? Is it possible? We need more information in addition to immediate action. In this talk, we will elaborate on the environmental impact of HEP, the areas where we need to know more, and immediate action that can and should be taken to address environmental impact beyond flights.

Flash Talk / 24

The Strategies for higher Sustainable future in HEP

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The thirst for knowledge that drives people is to unearth the nature. The fundamental laws are hidden in nature at the small scales and to explore this innermost structure of nature, study has

been done with particle physics. A facility with latest technologies and prospects adding the ideas for promising new avenues of investigation in the field of particle physics experiment does exist as the Large Hadron Collider (LHC) at CERN, Switzerland. The awareness and caring should be taken to make this study in the field of high energy physics (HEP) much sustainable in future. The strategies for such sustainability can be taken forward with some green initiatives. In an accelerator based working environment, the initiatives should be taken for 'production of electricity by fossil fuels'and 'reuse of hot water from a cooling plant for heating nearby residential areas'. The additional strategies can be taken which reduce carbon footprint factor and global-warming as well. The policy 'to make a robust digital platform to run the experiment remotely'can reduce the travel budgets considerably. In order to develop a potential digital platform and analyze experimental data, the ongoing software efforts need to be enhanced for better sustainability in the long run and cope up with new challenges. The HEP software would be available inside and outside HEP regime. Therefore, a versatile skill will be generated in future generation HEP software developers. Any future project for a major particle physics experiment must provide a detailed plan for 'saving and reuse of energy'.

Flash Talk / **25**

Connecting Scientists in a more Remote World

Author: Karolos Potamianos[1]

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Whether becuase of the COVID-19 pandemic or because of the desire to reduce our carbon footprint, HEP has had even more remote meetings than we previously had.

Students and younger members of our collaborations, who haven't yet built a strong network within the field because this is typically done locally or through in-person meetings, are overwhelmingly feeling isolated and unable to build up a network and grow.

We discuss ways to alleviate this and ensure that our community offers enough opportunities to network and build up collaborations.

Input and Discussion / **26**

Improving environmental sustainability in science

Author: Valerie Lang[1]

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An increasingly important aspect of working and living conditions in current times is environmental sustainability, both concerning us as scientists as well as the planet as the basis on which we perform our research.

Being at the forefront of knowledge and innovation, in the young High Energy Physicist Association (yHEP), we take our responsibility as drivers of change and innovation seriously –not only via the scientific research we conduct, but also for the way we perform the research. Future research should be excellent and reflect the responsibility for our planet at the same time.

We have collected ideas and proposals within the yHEP community and published them at the end of last year. The presentation gives an overview of the recommendations and some pointers where to continue next.

Input and Discussion / **27**

Energy Recovery Linacs and sustainability

Author: Olga Tanaka[1]

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Particle accelerators in general and Energy Recovery Linacs (ERLs) in particular, consume a large amount of electricity and emit a large amount of carbon dioxide. Considering ERL's R&D, to continue to gain the support of society, efforts such as energy saving of accelerators and utilization of natural energy are indispensable. In addition, further efforts should be done to build a clean infrastructure that contributes to the creation of a sustainable society using accelerators. In this presentation I would like to concentrate on the reasonable measures that could impact into sustainability, and to demonstrate what kind of course ERLs'should take for the next decades.

Input and Discussion / **28**

The environmental impact of LHCb

Author: Jonas Rademacker[1]

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The environmental impact of the LHCb experiment and its upgrade has been estimated in terms of CO_2 equivalents. We take into account the effects of travel (conference and collaboration weeks), electricity usage (magnet and online computing), flour-carbon gas leaks, and the lifecycle impact of new muon shield to be installed for the upgrade. This talk will present an overview of the preliminary results of this study. The Framework Technical Design Report for LHCb's future upgrades (mainly during LS4) will include a chapter on the environmental impact of the planned detector design and its operation, informed by these studies.

Input and Discussion / **30**

A retrospective on and lessons learned from ESO's first e-conference, #H02020

Author: Richard Anderson[1]

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H02020 took place in June last year and was the European Southern Observatory's e-conference. Originally planned as a classical conference to be held in Munich, we decided to convert the meeting to the virtual domain less than 3 months before the starting date. With little time to prepare and no real blueprint to go by, our goals were to conduct a scientifically engaging meeting and to draw some conclusions for how to make e-conferencing a useful, safe, inclusive, and carbon friendly addition to

the landscape of international scientific discourse. Our arXiv preprint 2104.00089 summarizes our meeting in some detail.

Here, we briefly describe the setup of #H02020 with a focus on how we sought to improve interactions between participants and for reducing participation barriers. Based on the feedback gathered and analysis of participant demographics, we also identify some issues that deserve further consideration to ensure that e-conferences can truly realize their potential for improving the diversity, equity, and inclusion dimension of global scientific exchange.

Input and Discussion / **31**

Reconnect

Author: Michael Spannowsky[1]

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The RECONNECT conference (Remote Conference on New Concepts in Particle Theory) was an international conference, organised by the IPPP in Durham during the first months of the corona pandemic. With this first edition we aimed to provide a forum in which the whole theoretical community can share the latest ideas that drive our field. I will briefly review the challenges and opportunities of the RECONNECT conference.

Input and Discussion / **32**

The Online Neutrino 2020 Conference

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Neutrino 2020 was planned to be held in downtown Chicago, but in March 2020 we had to re-plan it in 3 months as an entirely online conference due to COVID-19. I will summarize how we did this, what worked and what did not, and some of the things we learned about the future of conferences in the process.

Input and Discussion / **33**

Worldwide virtual conferences with local physical hubs

Author: Rachel Grange[1]

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More than 1000 researchers gathered online for the inaugural Photonics Online Meetup (POM, http://photonicsonlinemeetup.org/) on January 13th 2020. They simultaneously attend the five hours conference either alone from their personal computer or at their university from hubs distributed across five continents and many time zones.

The organization started in September 2019 with seven members scattered around the world, who mainly met on Twitter [1] and planed the event with web-based instant messaging and one online meeting [2]. As for a typical conference, two co-chairs lead the team and the other members some specific topics chosen by vote for this very first event. Three speakers were invited and a call for papers was launched few weeks later with around hundred submissions for the remaining nine presentation slots. A poster session took place on Twitter with an adapted template few days before the conference to accommodate for the high numbers of submissions.

This online event, retained most of the advantage of a typical conference, from learning from the interesting speakers, sharing results during a poster session, to question sessions, while avoiding most of the downsides of travel, including high registration costs (it was free), long plane travels and, visas, and strains on family-life. It was accessible to all, without limitation of budget, time and nationality. [3,4]

Nevertheless, a big concern was the lack of social interactions occurring naturally during conference breaks. Andrea Armani, co-chair of the conference and professor at the University of Southern California, suggested that local hubs be organised by researchers to give participants the opportunity to attend the conference together. This resulted in the creation of 66 physical hubs around the world with larger or smaller groups depending on the time of day or night gathering 635 persons, more than half the attendees. In the hubs, they were able to exchange ideas directly during the breaks or the talks while eating dinner or breakfast together. At some hubs, poster sessions were organized. This resulted in a combination of a physical and a virtual meeting that was highly appreciated by the participants and reported in some journals. [5]

Finally, such an online conference is not meant to totally replace the existing events, but to propose for some meetings an alternative while being more inclusive even with people who cannot easily travel and still want access to great research results.

[1] Original Tweet from September 7th 2019. Https://Twitter.Com/R1cc4rd0/Status/1170316966307016704.
[2] Reshef, O.; Aharonovich, I.; Armani, A. M.; Gigan, S.; Grange, R.; Kats, M. A.; Sapienza, R. How to Organize an Online Conference. Nat. Rev. Mater. 2020, 1–4.
[3] Pacchioni, G. Virtual Conferences Get Real. Nat. Rev. Mater. 2020, 1–2.
[4] Rethinking Conferences. Nat. Rev. Phys. 2020, 2 (2), 67–67.
[5] Pile, D. Photonics from Afar. Nat. Photonics 2020, 14 (3), 137–138.

Input and Discussion / **34**

Lessons learned from organizing online events

Author: Rogerio Rosenfeld[1]

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I'll mention some lessons learned from organizing two online events:
1) The Latin American Workshop on Observational Cosmology (www.ictp-saifr.org/lawoc2020)
2) The IV Joint ICTP-Trieste/ICTP-SAIFR School on Cosmology: Challenges for the Standard Cosmological Model
(www.ictp-saifr.org/cosmo2021)

Input and Discussion / **35**

Can we do a better job communicating our research to each other?

Author: Shaun Hotchkiss[1]

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Writing papers and giving talks at conferences (or seminars at institutes) were pretty good 20th Century ways to share our research with each other. Now that we're in the 21st Century we can try to take advantage of 21st Century tools. On my own and with others I've been trying to think about what this means in practice. Early experiments are the Cosmology from Home conference (a conference that embraces its online nature, rather than fighting it), the Cosmology Talks YouTube channel (a cosmology podcast for cosmologists), Cosmo Comments (an attempt to bring accountability to peer review), Cosmo Discussion (a community-wide Slack workspace) and a technical "Cosmology Wiki" (that doesn't exist yet). These experiments have a varied level of success so far. In the 8 minutes allocated I'll try to share some insights (of what works and what doesn't - and my thoughts on why). The 8 minute version might end up just being a teaser for a 45 minute version though .

Impulse Talk / **36**

Assessing the CO2 footprint on an institute level - more sustainable science practice by cutting emissions in computing and flying

Author: Jan Rybizki[1]

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Decarbonizing our research is imperative, both since it's our generic responsibility as well as to future-proof our ability to conduct research in 10-20 years time. We will showcase our astronomical institutes CO2 self-assessment and want to encourage you to implement similar monitoring schemes at your home institutions. Since current flying and computing use have a critically high CO2 footprint per researcher, we want to give input and ideas on how the science practice can be changed to facilitate a more sustainable future.

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Environmentally Sound, Socially Just, Academic Conferences

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At the school where I teach, the University of California, Santa Barbara (UCSB), 1/3rd of the carbon footprint for the campus comes from flying faculty and staff to a variety of conferences and meetings. The good news is that telepresencing can reduce the climate footprint of an academic conference by a factor of 100 or more.

However, the academic conference still has a range of issues that we need to address. The cost of airfare from many low- and middle-income countries to anywhere in North America or Europe is often greater than the per capita annual income in these countries. Consequently, scholars from most of the world's countries, and nearly the entire Global South, have long been quietly, summarily excluded from international conferences.

In this talk, I will discuss a nearly carbon-neutral (NCN) approach to conferences that we have been developing at UCSB for the past six years. From the start, our goal has been to stage more environmentally sound, socially just, academic conferences.

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Mobility, Inclusion and Academia

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The crisis occasioned by the coronavirus pandemic should give rise to major questions about our collective futures as academics, no matter what our disciplines. The cancellation of many in person academic conferences has been accompanied by a flourishing of online events organised through various platforms. Disability rights groups point out that they have demanded more accessible events over many decades and been told it would be too difficult to broaden access through virtual means. Almost overnight, a way was found to work online. The pandemic has highlighted fundamental assumptions about research distribution and exchange. It should cause us to ask how knowledge is produced now and how it could be produced in the future. We now see more clearly than before that long-distance travel leads to 'collateral'intellectual and ecological damage which can no longer be ignored and which we can no longer accept as simply 'collateral'. It is in fact central to how we have worked so far. New practices of knowledge production and dissemination are urgently needed. In our talk we will discuss how the conference model of academia in which usually northern-based scholars have the opportunity to showcase their work at numerous national and international meetings has been based on exclusion. It relies on economic surpluses to fund all the globetrotting. It leads to ecological degradation. It is driven by socio-economic, class, race and gender divides. The hypermobility of scholars in the Global North must now be challenged. We need to look hard at our paradigms of knowledge production and call into question how structures in the university sector have intensified global inequalities.

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Energy Efficiency of Accelerator-Driven Research Infrastructures

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Particle accelerators are essential tools for high energy physics and other research directions. After accelerating a primary charged particle beam these facilities generate specific radiation in a second step. The desired secondary radiation could be synchrotron radiation, free electron laser (FEL) pulses, neutrons, or exotic particles by colliding beams for HEP research. The entire process can be understood as a step-wise conversion of grid energy to the mentioned secondary radiation. Despite of enormous advancements in the last decades proposed future collider facilities will consume a significant fraction of the power production of a typical coal or nuclear power plant. After an introduction to the problem, conceptual and technological R&D directions to improve the energy efficiency of accelerator driven RI will be presented.

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Panel discussion: The Challenge for Institutions

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Panel discussion: Social-Justice Dimension of Online Formats

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Opening Remarks

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Workshop Introduction

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