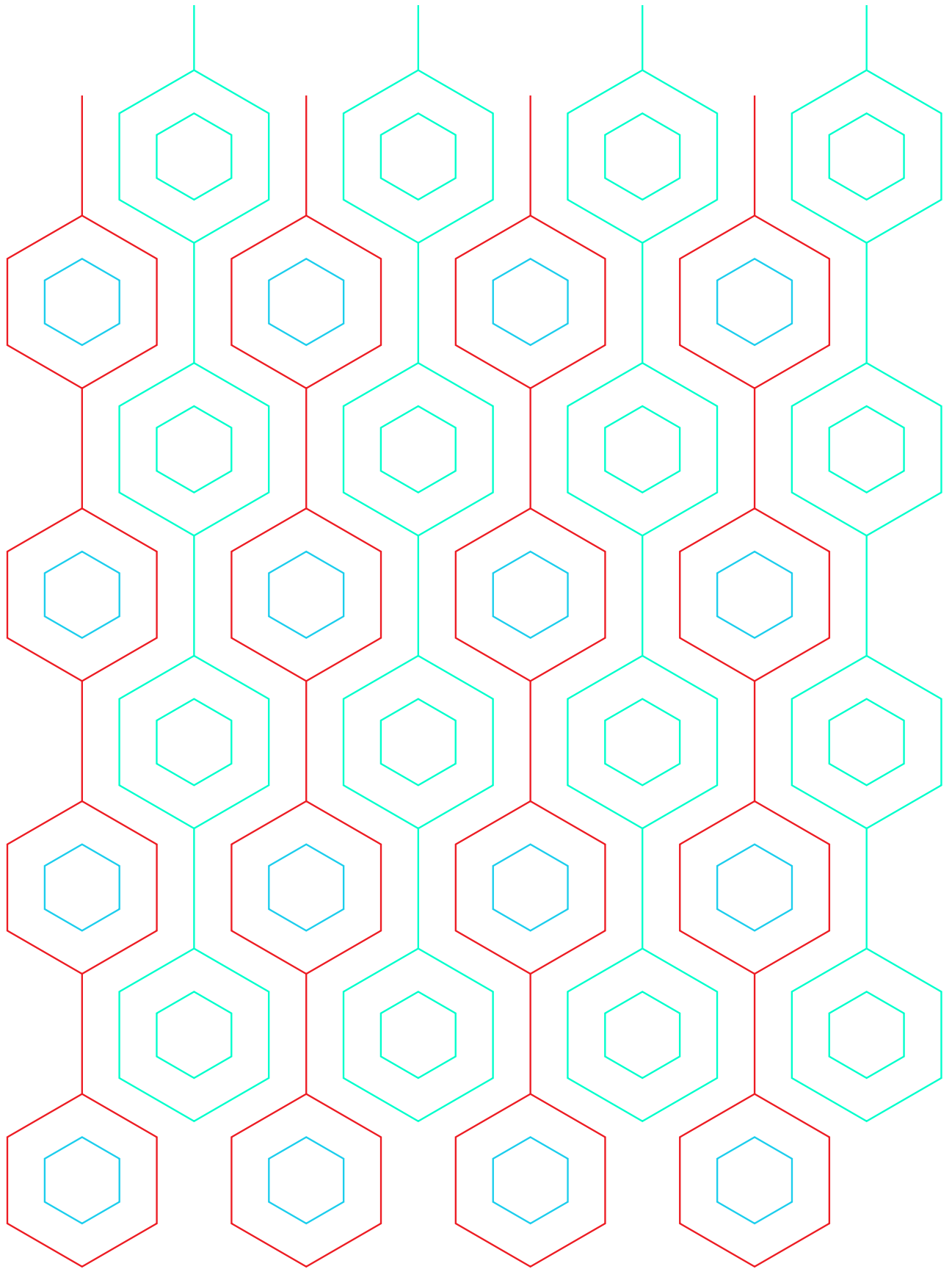


SIS Activity Report **2023**



Scientific
Information
Service



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WELCOME

Dear Reader,

Welcome to the 2023 edition of the Activity Report of CERN's Scientific Information Service.

Since its founding, collaboration has been a central ethos for CERN, as a collective undertaking of humanity to uncover what the universe is made of and how it works. Our highlights from 2023 further demonstrate the power and potential of international scientific collaboration, yielding from collaborative traditions both in particle physics and the open science movement.

In 2023, we joined forces with NASA to accelerate the adoption of open science. We co-hosted an international Open Science summit in July, to bring together scientists and policy makers along with Open Science experts and enthusiasts, inviting them all to follow NASA and CERN's example in adopting open science practices and policies in their organizations. This event was the kick-off of a movement which we hope will lead to many concrete implementation examples at institutions around the world.

The Scientific Information Service has established a center of excellence for hosting and operating open scholarly communication infrastructure in CERN's powerful data center. While the particle physics community has long benefitted from tools like INSPIREhep or HEPdata, a new collaboration with the OAPEN foundation will soon bring these benefits to all other scientific disciplines.

CERN and UNESCO share common values and have collaborated in the past on many aspects. Open Science is a new concrete domain where both organizations are working closely together. Following CERN's contributions to the development of the UNESCO Recommendations on Open Science (2021), the first UNESCO Open Science Outlook was formally presented at CERN in December 2023.

But we also had to say goodbye to two colleagues that contributed to our success for decades. Both, Anita Hollier, section leader of the SIS Archive and Tullio Basaglia, the head of the SIS Library section left the Scientific Information Service to enjoy their respective retirements.

Enjoy reading the 2023 edition of our Activity Report. I hope you can get inspired yourself. If you wish to collaborate with us, please reach out to me.



Alexander Kohls
Group Leader Scientific Information Service

A handwritten signature in blue ink, consisting of several loops and a long horizontal stroke.

2023 HIGHLIGHTS

GROUP RETREAT

In October 2023, the entire team of the Scientific Information Service met for a 2-day retreat at the shores of Lac d'Annecy. For this creative innovation workshop, we had the honour to welcome Joachim Mních, CERN Director for Research and Computing, Chelle Gentemann, NASA Open Science Program Scientist, and Bastian Drees, Head of Library and Scientific Information Management at EMBL. Inspired by presentations from our guests and a review of SIS' achievements of the last years, the group split into teams to jointly develop innovative ideas that will improve SIS services in the years ahead. The results were absolutely stunning and you can remain curious to read in future editions about some fantastic new projects to be launched. And of course, we also had lots of fun during some challenging team building activities.



Building bridges during the Group Retreat

CERN-NASA OPEN SCIENCE SUMMIT 2023

CERN and NASA are two organizations that are dedicated to open science and used to international collaboration. So it was a natural fit, when both Open Science pioneers decided to jointly organise a global Open Science Summit called “Accelerating the Adoption of Open Science” at the occasion of the 2023 Year of Open Science. Almost 300 participants joined for the hybrid event at CERN or via Webcast and enjoyed inspiring presentations and exciting panel discussions delivered by more than 40 international experts. Yet, this event was only the beginning. Following a visionary closing statement, participants organised themselves in several follow-up working groups to apply the learnings and inspirations across hundreds of organisations. Read more on page 15.



Poster for the CERN/NASA Open Science Summit (July 2023)

LIBRARY REOPENING

After several years of preparatory work and one year of construction, the new CERN Library and Bookshop opened in September 2023. The building was completely renovated and equipped with modern technical installations such as electrical blinds, and a highly efficient air conditioning and heating system. The floor plan was redrawn to better address today's needs of library users, and modern ergonomic furniture enables users to study comfortably in a healthy environment, as well as giving the library a fresh new look! The new library premises were reopened with a formal ribbon-cutting ceremony followed by two days of festivities including games and live music. Read the full story on page 10.

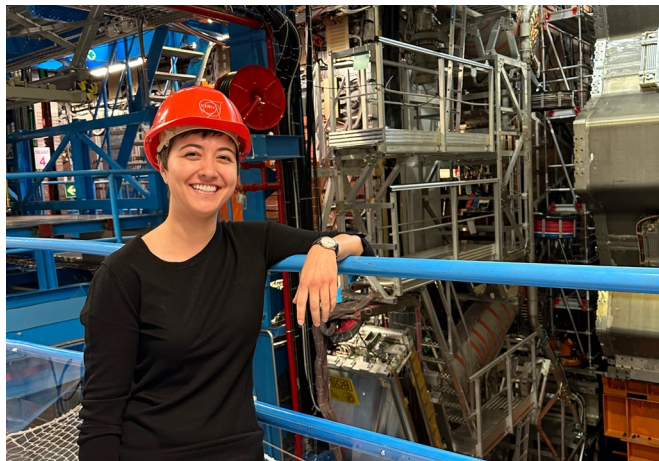


Charlotte Lindberg Warakulle delivering remarks at the inauguration ceremony of the CERN Library

ARCHIVES

NEW ARRIVAL IN THE ARCHIVES TEAM

Olivia Mandica-Hart joined the SIS team in September 2023 as the new CERN Archivist, joining the Organization from Harvard. She works to ensure the preservation of historical material and make it available for future generations. She is the guardian of CERN's history.



Olivia Mandica-Hart, CERN's new Archivist

A LOT GOING AHEAD IN MATTER OF ARCHIVING

2023 saw the fusion of the Archives & Library into one section, the retirement of the former archivist, and the arrival of a new expert. The Archives staff continuously served the community and answered internal and external requests. They assisted researchers in their quest to discover treasures in the archives and facilitated the transfer of material to the historical archives alongside CERN personnel.



Archive premises and shelves

Several collections were fully cataloged this year, including those of:

- Raoul Gatto
- Linac
- CHS (CERN History Study) & CHIP (CERN History Project)
- LEP
- Maria Fidencaro
- Marilena Streit-Bianchi.

And many boxes from the Pauli Collection received archivally appropriate physical treatment.

The CERN Archives also took physical custody of the 20 000 CERN historical photos, slides, and negatives that were digitized some years ago.

In addition to the usual tasks of appraising, sorting, describing, storing, and making available CERN records, SIS initiated a risk assessment of the preservation conditions of the physical archives, in order identify current issues and ensure the best possible conservation of CERN's unique historical documents. A first step started in 2023 was to work on the selection of new archival boxes that meet the finest archival standards.

A big undertaking ahead for SIS is also the revision of the CERN Operational Circular number 3 '*Rules applicable to archival material and archiving at CERN*' and its subsidiary document, the '*Archiving policy at CERN*'. In 2023, SIS started meeting with the Departmental Records Officers and prepared a survey to better understand the current practices at CERN regarding records management and archiving. The results, further discussions, and future roadmap for the revision of the policy are on the agenda for 2024, in collaboration with CERN departments and experiments.

DIGITIZATION PROJECT

The Proton Synchrotron (PS) digitization project which commenced in 2021, continued throughout the past year. With the ingestion of 7 335 records in 2023, the total number of digitized documents made available through this effort is now 16 083 records. These have been classified according to the 60 groups that comprised the PS Division between 1952 and 2002. This project has required thorough and extensive work to find missing documents as well as merging duplicates existing in the CERN Document Server, in order to make this invaluable collection as complete as possible to researchers. The work will continue in 2024 to finish the PS series, and then move on to the Super Proton Synchrotron (SPS) documents.

Status: 16 083 records uploaded
 2021: 260 records
 2022: 8 488 records
 2023: 7 335 records



Monthly records added during the PS Digitization Project (2021-2023)

Access to these documents has been enabled through a [dedicated webpage](#) which provides information about the structure of the collection, its groups and managers, and provides access to lists of all the documents produced by the PS groups.



The PS Parameter Committee members: Left to right: Edouard Regnier, Pierre Germain, Kjell Johnson, Arnold Schoch, Mervyn Hise, John Adams, Franco Bonaus, Fritz Grütter, Kees Zegerschoon and Colin Ramn. June 1960 (Image: CERN)

Documents	Series	Groups	Years
AA	AA Series	Antiproton Accumulator: AA fused with LEA group to form AR group in 1988. Antiproton Accumulator Running in (AAC-R) Antiproton Collector (AC - ACCOL - TITAC - TACTIC)	1978-1987
AD	AD Series	Antiproton Decelerator	1997-1997
AE	AE Series	Acceleration and Ejection	
AE2	AE2 Series	Accelerators and Experiments	
ALJALO	ALJALO Series	Apparatus Layout: AL grt	
AR	AR Series	Accelerator Research: Th	
AR2	AR2 Series	Antiproton Rings: This gr	
BD	BD Series	Beam Diagnostics	

PS Archive
 Search 15,734 records for:

Documents by PS Groups/Series:
 AA AD AE AE2 ALJALO AR AR2 BD BR BT CA COCCI CD CLIC COP CTF3 DVL/DIR EA EE EI EM EN ENS Energy EP FES GE HBC HI HP LEA/LEAR LJA/LJN/LRF LP/LPI MA ME MG ML MM NU NUFAC OP PA PO/POW PP PSO PSR RF SA SC SE SM SR VA TH

1st Reports - Authors Reports - PS Committees - Bulletin Info

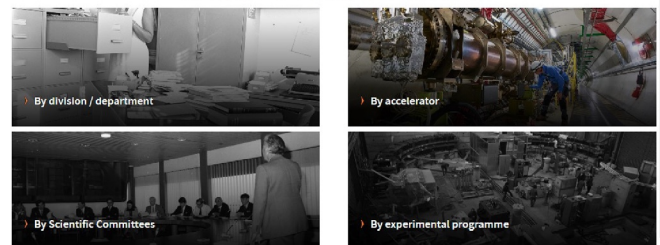
Web pages and CERN Document Server showing the categorization developed to navigate the PS documents

IMPROVING ACCESS TO DOCUMENTS

Optical Character Recognition (OCR) has been enabled on the content of *Accelerators Research* (1961-1966) and *Intersecting Storage Rings* (1966-1982), on over 3 200 PDF files. OCR makes these documents fully searchable and allows researchers to benefit from the full-text and find information faster.

The web pages on the SIS website are also continuously updated and enriched. A new section organising the access to CERN documents is now available. As an example, the CERN Experimental Programme pages offer access to the information of 1 400 experiments, reuniting the links to the experiment, proposal, Grey Book, and publications on the CERN Document Server. The Archive is also collaborating with the Scientific Committees Secretariat to enhance their archive web pages.

Access to CERN documents



The CERN Experimental Programme

View	Edit	Delete	Manage display	Revisions
SC Programme - SC*	ISOLDE Programme - IS*	LEP Programme - ALEPH - DELPHI - L3 - OPAL - OPAL BILMES - LEP5 BILMES - LEP5 MODAL	RD Programme - RD*	
PS Programme - AD* - C*: Serpukhov - E*: Emulsion - EUNA - K*: Nuclear Chemistry - nTOF* - P*: Electronics - PS* - S*: Counter - T*: Bubble chambers - W*: Wilson chamber - X*: Ecole Polytechnique	ISR Programme - R*	LHC Programme - ALICE - ATLAS - CMS - LHCb - LHCf - LHC Computing Grid - MOEAL - SND@LHC - TOTEM	Neutrino Research Programme - ICARUS - ProtoDUNE - PLFOND - ProtoDUNE SP - Baby MIND - FASER - ENJUBET - ND280	

Main links

- CERN Experimental Programme**
 - Current Experiments (Grey Book database)
 - All (incl. history archives)
- Scientific Committees**
 - Current
 - All (incl. history archives)
- CDS Publications**
 - Current Committees
 - Former Committees

Webpages providing 'Access to CERN documents' and 'The CERN Experimental Programme'

COLLABORATION WITH THE ARTS@CERN PROGRAM

The Archives service collaborated throughout 2023 with the Arts at CERN group, helping artists from all over the world discover CERN's history. Arts at CERN is the leading arts and science program promoting dialogue between artists and physicists.

Following the success of the traveling exhibition "Capital Image" by Armin Linke and Estelle Blaschke at the Folkwang Museum in Essen and the MAST Foundation in Bologna, the bubble chamber images are currently being exhibited at the Pompidou Museum.

CERN ANALYSIS PRESERVATION

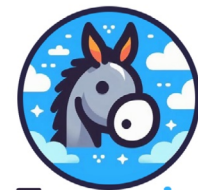
The CERN Analysis Preservation (CAP) project has progressed significantly over the past year, building upon the foundational efforts established in 2022. Our commitment to enhancing the technical infrastructure and promoting wider adoption within the scientific community has led to several key achievements and developments.

CAP @ Landscape Project Initiative: The launch of the Landscape Project marks CAP as the essential platform for small experiments focused on capturing and preserving their analyses and work. This initiative underscores our commitment to offering a comprehensive support system for research preservation.

Enhanced Features and Usability: The platform has been enriched with improved form features, including advanced shareability and export formats. These enhancements aim to adapt CAP to meet the diverse requirements of users, making it more user-centric and versatile. The strategic unification of the User Interface (UI) with other projects within our group, along with an upgrade to the latest version of our front-end technology, has significantly enhanced the coherence and intuitiveness of the user experience across platforms. This ensures a seamless interaction for users, aligning with the goal of providing a robust, user-friendly environment.

Introduction of New Experiments and Working Groups: This year, we initiated partnerships with new experiments and working groups, such as the ADLs working group and the CMS GEN working group. These collaborations are vital for the iterative testing and enhancement of CAP's features, ensuring it stays at the forefront of analysis preservation technology.

Form-Builder Project: A significant milestone was achieved with the externalization and open-sourcing of the form-builder project, leading to the creation of the *react-formule* NPM package. This development not only emphasizes our commitment to the principles of open science but also



Formule

DEMO

commitizen friendly

What is Formule?

Formule is a **powerful, user-friendly, extensible and mobile-friendly form building library** based on [JSON Schema](#) and [RJSF](#), which aims to make form creation easier for both technical and non-technical people.

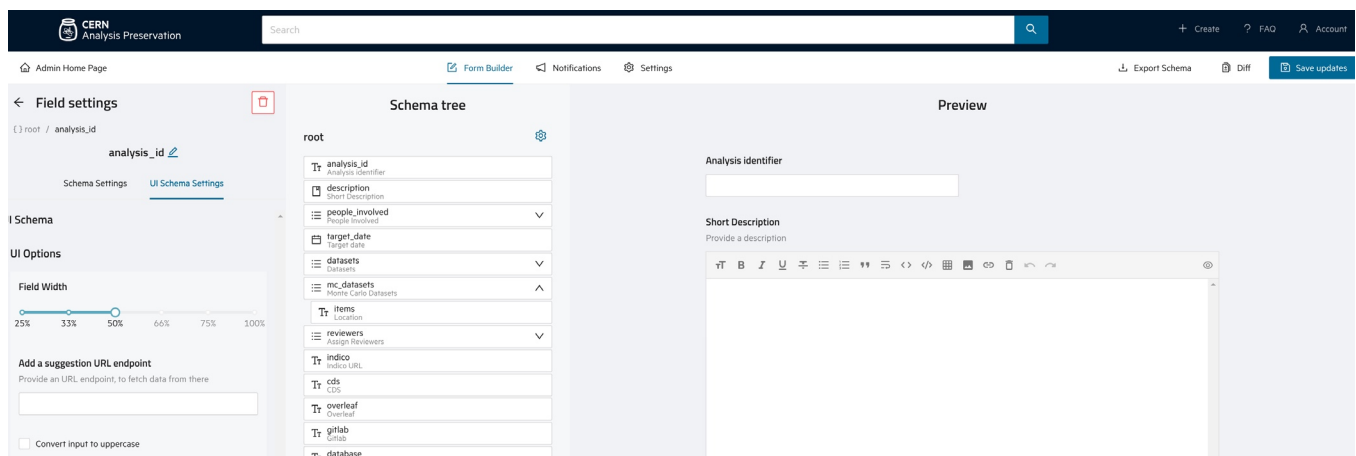
It originated from the need of a flexible tool for physicists at CERN to create their custom forms in the [CERN Analysis Preservation](#) application (a process that was originally done by the CAP team who had to manually define the JSON schemas for every member experiment) in a zero-code fashion. This tool proved to be very useful for us to more easily scale and expand, reaching a wider audience here at CERN. So, we thought it could also be useful for other people and decided to decouple it from CAP and release it as an open source library.

Formule repository in GitHub

broadens the accessibility and utility of our tools for the broader developer community. The *react-formule* package is a pivotal resource, fostering collaborative innovation within and beyond our immediate community.

Admin Panel Introduction: A notable addition this year has been the introduction of the Admin Panel for admin users. This new feature allows users to organize their individual collection spaces, tailor settings, permissions, and configurations for their space and set up notifications for various actions. The Admin Panel empowers users with greater control and flexibility over their data and metadata management, further enhancing the CAP's utility and user experience.

Reflecting on the progress made in 2023, we are inspired by our mission to support the scientific community through the CAP project, and through continued innovation and collaboration, to push the boundaries of what is possible in scientific analysis preservation.



User interface of the admin panel in CAP

INSPIRE

REFERENCE CORRECTIONS BY USERS

Having accurate reference lists and reliable citation tracking is of high importance for INSPIRE. They provide key mechanisms for users to discover related papers by following citation and reference links and find the most impactful publications and authors.

While the extraction of references from the document text and matching them to other INSPIRE records to establish citation links happens automatically, various issues might cause the process to fail for a given paper or reference. In

those cases, users would often write to the INSPIRE team and request that references be corrected. This process was inefficient for all parties involved: users needed to spend time explaining precisely what needed to be corrected, and the INSPIRE curation staff needed to understand the message and perform the operation manually.

Since July, this process has been improved by allowing users to perform corrections themselves in the system. After logging in with their ORCID account, they are able to click on “Edit” buttons next to any unlinked or incorrectly linked reference and search for the correct one (see Figure).

References (15)	Figures (0)
[1] Superstring theory, Vol. 1, Cambridge University Press M.B. Green, J.H. Schwarz, E. Witten	edit
Black holes and Calogero models	
[2] G.W. Gibbons (Cambridge U., DAMTP), P.K. Townsend (Cambridge U., DAMTP) Phys.Lett.B 454 (1999) 187-192 • e-Print: hep-th/9812034 • DOI: 10.1016/S0370-2693(99)00266-X	edit
[3] Ideas and methods of supersymmetry and supergravity: Or a walk through superspace I.L. Buchbinder, S.M. Kuzenko	edit

‘edit’ buttons are now displayed on all references and allow users to easily make corrections

INCREASING COVERAGE OF QUANTUM PHYSICS

With the recent interest in Quantum Information by the global HEP community and at CERN in particular, the INSPIRE collaboration decided a couple of years ago to also target that subject and offer our services for the benefit of researchers in the field. While our coverage of historical publications is not complete yet, 2023 nonetheless saw a significant increase of available papers: 25 000 were added, accounting for more than one third of all literature additions last year. This was made possible thanks to a better definition of the areas that are of interest to the Quantum Information and HEP communities, made possible by a close cooperation between domain experts and the INSPIRE curation team.

KEY INSPIRE FIGURES

- 8.6M** VISITS TO THE WEBSITE IN 2023
- 1.6M** LITERATURE RECORDS WITH 71K ADDED IN 2023
- 33M** CITATIONS TRACKED BETWEEN PAPERS
- 4.1M** AUTHORSHIP CLAIMS ON PAPERS IN AUTHOR PROFILES
- 6.6K** REFERENCES CORRECTED BY USERS
- 101** JOB OPENINGS ANNOUNCED IN 2023
- 362** SEMINARS ADVERTIZED IN 2023

LIBRARY

NEW ARRIVAL IN THE LIBRARY TEAM

Lydia Pieper arrived as a new staff member in the Library team in April 2023. She is mainly in charge of book acquisitions and interlibrary loans, as well as cataloguing and ingesting books and e-books in the library catalogue. She is a key face for regular library users, dealing with their requests to find documents, both in-person and online.



Lydia Pieper, Librarian

CERN LIBRARY REOPENED AFTER ONE YEAR OF RENOVATION

The CERN Library, which had been closed since October 2022 for renovation work, reopened at the end of September 2023.

Several milestones and events punctuated the year. In March 2023, the first-stone ceremony, co-organized by SIS and the Site and Civil Engineering Department (SCE), celebrated the end of the demolition phase, leaving the library completely free for reconstruction. After official speeches highlighting



Newly renovated and refurbished Library space, open 24/7

the importance of the library as a physical space in today's world, and the value of collaboration across CERN departments, a time-capsule was inserted into the new wall replacing the previous entrance.



Mar Capeans and Joachim Mnich, placing the time capsule into the wall

SIS worked closely with CERN Procurement, the furniture provider, and the Graphic Design Office to design and select the future look of the library. The installation took place in August and was followed by the relocation of books up to the end of September. During the whole closure and the removal, library services always continued to be operational and the collections available on request, in our temporary premises and online.



Ribbon cutting ceremony, from left to right: Raphaël Bello, Director for Finance and Human Resources, Salomé Rohr, Archive & Library Section Leader, Charlotte Lindberg Warakaulle, Director for International Relations

The library reopened on 28 September 2023. The opening ceremony was followed by two days of festivities where SIS invited the CERN Community to discover the new premises and learn about our services.

The celebrations kicked off with a ribbon-cutting ceremony in presence of Raphaël Bello, Director for Finance and Human Resources, Charlotte Warakaulle, Director for International Relations, and Mar Capeans, after which the library officially opened its doors to the public

The festivities continued with a range of activities: visitors were able to sign-up for hour-long treasure hunt sessions over the next two days, and were able to win a limited edition bookmark by participating in various mini-games in which they could challenge a librarian in barcode-scanning, try to win a race while balancing a book on their head, or solve a riddle to guess the author of a paper from the CERN Archives.



Solving riddles for the treasure hunt

The festivities were accompanied by live music: a special acoustic performance by Danegeld, followed by the band Waitlist (featuring SIS Group Leader Alex Kohls on the keyboard!). A big thank you goes to the CERN MusiClub for helping with the organisation of the equipment.



Danegeld playing a live acoustic gig at the CERN Library



Grand finale of the evening with a performance by Waitlist.

STAYING UP TO DATE WITH LIBRARY SERVICES

In addition to the common Library services, such as acquisitions and access to physical and online books, e-books and journals, borrowing and interlibrary loan services, the in-person and online reference desks, SIS continuously worked on improving its support to the CERN Community. Here are some highlights of 2023:

A new solution for technical standards

In 2023, CERN opted for SNV-Connect, a platform providing access to more than 45 000 technical standards to the CERN Community. This tool eases the life of engineers, technicians and many more colleagues at CERN that need to follow applicable standards in their activities or look to improve their services. The available standards cover many diverse topics.

New Library also means a new Bookshop...

The CERN Bookshop benefited from revamping at the same time as the Library. This service has been offered for many years to the CERN Community and now in a central location, at the entrance of the Library, at the corner of building 52 and 53. With a catalogue of 650 titles and the possibility to order work-related books on demand, the Bookshop complements the Library activities by offering the chance to the community to buy their preferred books at preferential prices. The Bookshop collaborates also with the CERN Shop in the Science Gateway for books that are of relevance to the general public.

The backoffice software for Stores management also got an upgrade. SIS was involved to model and test the Bookshop processes in the new system with the Business Computing group, in the view of the go-live in January 2024

.... and new infrastructure

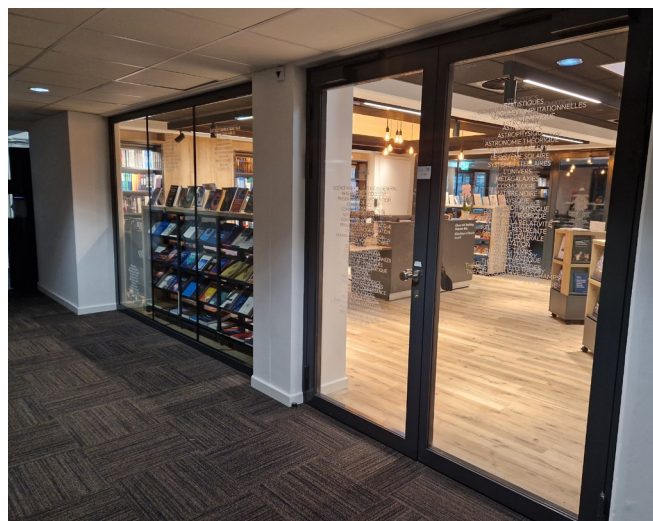
The renovated Library premises were designed to offer a functional space with upgraded equipment. The 40 workplaces, available 24/7, are all connected with electrical plugs (Swiss and European plugs, USB-A and USB-C). Lockers have also been installed to allow users to store their belongings while working in the library. In addition, comfort has been added with a water fountain, a coffee machine, comfortable lounge chairs with stands for laptops, a photocopier, public library PCs to consult the library catalogue, and more. These new additions further enhance the user experience and provide a place where people can be at ease to read, think and work. As part of a project to improve the library accessibility, magnifying glasses can be rented at the Library desk. This project will be continued in 2024 with additional actions pertaining to improving diversity and inclusiveness.

Reading corners

SIS is developing its collaboration to propose 'reading corners' on specific subjects on the library shelves, such as 'Women in Science' or 'Open Science,' making sources of information on these topics of broad interest available for the CERN community. SIS happily collaborates with other services to set up such selections of books for the benefit of other colleagues, fostering the sharing of knowledge.

Did you know what curation is in librarianship?

What does 'curation' mean when we are talking about CERN scientific publications? Through various workflows and processes, SIS ensures that all the CERN scientific publications end up in CERN's institutional repository, the CERN Document Server. Part of the actions are automated but, behind the scenes, our librarians manually curate a lot of information to ensure the publications are completely and accurately referenced, as you can see from the Facts & Figures on the following page.



New CERN Bookshop, open since September 2023, Monday-Friday, 9 a.m. – 6 p.m.



New Bookshop space and Library & Bookshop Welcome desk

THE LIBRARY EVENT SERIES SPARKLED THE YEAR



Michel Mayor and Paola Catapano talking about the book 'Advances in cosmology', October 2023

In addition to the Library inauguration event, eight book presentations were organized for authors and readers to meet and foster discussions:

- *Geometry Modelling in High Energy Physics Experiments* by Alexander Sharmazanashvili. 2022.
- *Quantum Mechanics: A Mathematical Introduction* by Andrew J. Larkoski. Cambridge University Press, 2022.
- *Handbook of Accelerator Physics and Engineering*. by Alexander Wu Chao, Maury Tigner, Hans Weise, Frank Zimmermann (eds.). 3rd edition. World Scientific, 2023.
- *Ottantesimo parallelo : un'avventura tra scienza e ghiacci* by Paola Catapano. Salani, 2023.
- *Advances in Cosmology* by Marilena Streit-Bianchi, Paola Catapano, Cristiano Galbiati, Enrico Magnani (eds.). Springer, 2023.
- *Quantum Steampunk: the Physics of Yesterday's Tomorrow* by Nicole Yunger Halpern. Johns Hopkins University Press, 2022.
- *Interstellar: the Search for Extraterrestrial Life and our Future Beyond Earth* by Avi Loeb. HarperCollins, 2023.
- *Prima del Big Bang* by Gian Francesco Giudice. Rizzoli, 2023.

Six Library Science Talks, co-organized by SIS, AILIS (Association of International Librarians and Information Specialists) and the Zentralbibliothek Zürich, took place in 2023, either in hybrid or online format:

- "Self-organisation and cooperation using the example of the FID system in Germany: libraries as systemic supporters of the information infrastructure" from Reinhard Altenhöner (Staatsbibliothek zu Berlin)
- "Articulating public library impact: a multi-dimensional perspective" from Daphna Blatt (New York Public Library)
- "Open Science at Maastricht University" from Colleen Campbell (Maastricht University)
- "How are transformative agreements transforming libraries?" from Colleen Campbell (Max Planck Society, Munich, Germany)
- "DIGITENS: DIGITAl ENcyclopedia of European Sociability" from Isabelle Le Pape and Jean-Philippe Moreux (Bibliothèque nationale de France)
- "Digital innovation at the Library of Congress: checking in from LC Labs" from Laurie Allen (Library of Congress, US)

ARCHIVES & LIBRARY FACTS & FIGURES 2023

3 479	LOANS ISSUED
3 271	PDG BOOKLETS SENT
8 572	DOCUMENTS ADDED IN THE CERN LIBRARY CATALOGUE
996	LITERATURE REQUESTS PROCESSED
3 747	RECORDS CURATED IN INSPIRE BY THE SCIENTIFIC INFORMATION SERVICE
14 803	RECORDS CURATED IN THE CERN DOCUMENT SERVER BY THE SCIENTIFIC INFORMATION SERVICE
400	NEW ARCHIVAL ENTRIES IN THE CERN ARCHIVES ON THE CERN DOCUMENT SERVER
7 335	DIGITIZED RECORDS IMPORTED IN THE CERN DOCUMENT SERVER
1 707	INSPIRE TICKETS RESOLVED BY THE SCIENTIFIC INFORMATION SERVICE
1 051	SERVICE-NOW TICKETS RESOLVED BY THE ARCHIVES & LIBRARY TEAM

OPEN ACCESS

Since the introduction of the CERN Open Access Policy in 2014, SIS has implemented various measures to support CERN authors in meeting the requirement to publish their research papers fully Open Access (OA).

The strategies introduced by SIS are crafted to streamline the process for CERN authors to adhere to the OA policy. One prominent avenue is the Sponsoring Consortium for Open Access Publishing in Particle Physics (SCOAP³), which remains the most straightforward method for authors to publish OA within the field of High Energy Physics. Apart from SCOAP³, CERN actively supports alternative collective models, such as *SciPost*, wherein OA publication is available to all authors at no expense. The collaboration agreement with *SciPost* was renewed and enhanced in 2023. Additionally, CERN SIS has long been a supporter of *Physical Review Accelerators and Beams*, a journal published by APS, which also offers open access publication to any author. The Subscribe to Open model, in which current subscribers of a journal facilitate OA publication for all, has been developed by *Annual Reviews*, and CERN has maintained their subscription to endorse this model. This support has enabled full OA to the *Annual Review of Nuclear and Particle Science*, as well as other journals from this publisher.

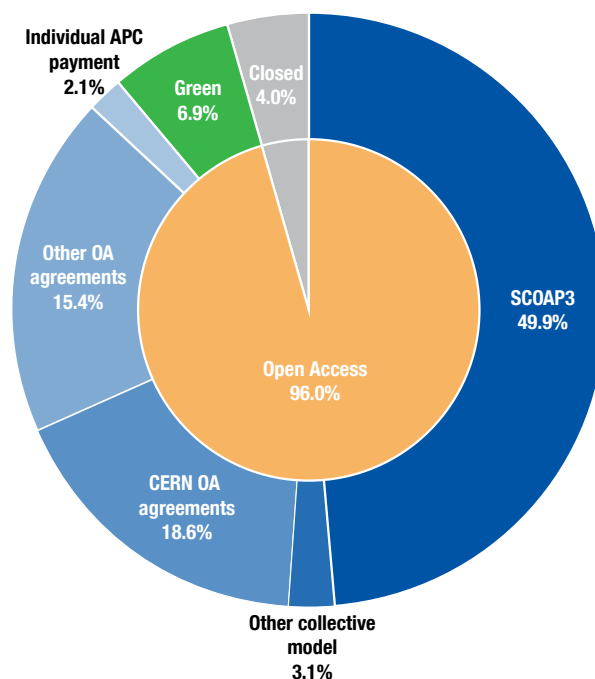
Even if the collective models as described above remain the preferred models at CERN, in order to offer a wide spectrum of OA options, SIS has engaged in several 'Read & Publish' (R&P) agreements with publishers. These agreements negotiate OA publishing rights for CERN authors alongside access rights to paywalled content. By 2023, CERN had secured a considerable number of R&P agreements, including a renewed agreement with Springer Nature, thanks to the Swiss Consortium of Academic Libraries, of which CERN is a member. In 2023, SIS concluded negotiation of agreements with APS & IEEE for the renewal of contracts in 2024.

Through a combination of the mechanisms above, SIS has facilitated automatic open access publishing across over 4 000 journals relevant to the research program at CERN. These mechanisms enable authors to readily comply with the OA policy requirements. As a result in 2023, 96% of the 1 109 CERN primary research articles were published Open Access.

SIS further supports other initiatives aimed at promoting the adoption of OA and open science practices. This includes supporting OA to books, not only through the SCOAP³ for Bbooks initiative but also through other models such as MIT Direct to Open. In addition, CERN SIS also contributes to Open Science efforts through its backing of the SCOSS (Global Sustainability Coalition for Open Science Services) initiative. SCOSS serves as a funding platform for key infrastructure services essential for the OA and OS

ecosystem. By supporting SCOSS, CERN SIS ensures the sustainability and continued operation of essential services that facilitate OA and OS practices (e.g. ROR, DOAJ, OAPEN).

SIS continues to play a pivotal role in fostering OA publication within the CERN scientific community by implementing various strategies, engaging in partnerships, and actively supporting initiatives that promote open access and open science principles.



OA share of CERN publications

OPEN SCIENCE

NEW AND SCALABLE OPEN SCIENCE GOVERNANCE

Open Science was further formalized at CERN through a revised Governance Structure approved by the Enlarged Directorate in 2023. This new structure replaces the former Open Science Strategy Working Group (OSSWG), and creates a more streamlined and scalable organizational structure to better support the implementation of CERN's Open Science Policy.

The new governance structure comprises an Open Science Steering Board (OSSB), an Open Science Practitioners Forum (OSPF), and the CERN Open Science Office. The OSSB is an inter-departmental body reporting to the Director for Research and Computing, with a mandate to oversee at the strategic level implementation measures, infrastructure, technology services, and outreach and education efforts. The OSPF is established to ensure organization-wide efficient communication among all entities driving open science activities and policy implementation. Given the increasing level of complexity during the implementation of different open science practices, engagement in the OSPF and its potential working groups is hoped to be increased over time. A new CERN Open Science Office, situated within SIS will support the OSSB and coordinate the OSPF activities. In addition, it will provide services to the CERN community such as assisting in the creation of data management plans. The OS Office will leverage activities to further participation in the OSPF in the forthcoming years and support the community to bring new topics for broader discussion in this forum.

CERN-NASA SUMMIT “ACCELERATING THE ADOPTION OF OPEN SCIENCE”

In early July 2023, CERN and NASA teamed up to bring a community of open science policy experts, practitioners and interested researchers from around the globe together to advance the adoption of Open Science policies and practices. For one week, around 100 participants met at CERN for the [CERN-NASA Open Science Summit](#), while twice as many followed sessions remotely, consisting of presentations and panel discussion with each day dedicated to one element of open science. Each afternoon was then dedicated to topical workshops, encouraging participants to apply discussed concepts to their respective contexts.

A [closing statement](#) was made available summarizing the main takeaways from the summit, as well as a call for action to the global community. The latter is being supported by ongoing Working Groups (supported by the Open Research Funders Group) on selected topics. All presentations and recordings have been made available on [Zenodo](#).

While the event was very rich and offered complex and

inspiring discussions, below is yet an attempt to briefly summarise the five summit days:

Day 1: Setting the scene

During the initial day, the concept of open science was introduced as a solution to enhance research efficiency, transparency, and collaboration. An emphasis was placed on involving the public and embracing certain core values to democratize the scientific process and ultimately make science a globally beneficial public resource.

Day 2: Open Data

The second day was focused on various aspects of open data, including the notion that data should be open to the extent required, while maintaining certain necessary restrictions (e.g. privacy concerns, etc.). The FAIR principles (Findable, Accessible, Interoperable, Reusable) were introduced as a framework to ensure the effectiveness of open data. The importance of managing research data adequately was discussed, including capturing essential metadata and contextual information. A culture shift towards valuing data management was advocated to ensure the integrity and accessibility of research findings.



Attendees of the CERN/NASA Open Science Summit

Day 3: Open Source

The focus of the third day of the conference was the role of open-source software and open source hardware within the realm of research. Software plays a pivotal role in various research phases such as data collection, analysis, and visualization. A shift in perspective was advocated, suggesting that software should be regarded as a tangible research outcome. The significance of recognizing and rewarding software contributions was highlighted, along with the idea of fostering community around open-source projects. The differences between traditional academic practices and open-source principles were explored, underlining the importance of effective community management for software and hardware projects.

Day 4: Reproduce, Reuse, Reward

The fourth day centered around the guiding principles of open science, including maintaining research integrity and promoting societal benefits. The conversation stressed the need to align personal incentives with practices that support open science, such as data reuse and sharing null results. The necessity of reforming research assessment practices within academia was stressed to accommodate these principles and create a conducive environment for open science.

Day 5: Towards Open Science

During the final day's discussions, open science was positioned as an enabler for participatory science and the democratization of knowledge. The concept was contextualized within the challenges faced by different regions and societies. The importance of building momentum and aligning incentives was underscored to promote the integration of open practices into various research activities. The need to bridge the gap between theoretical open practices and their practical implementation was also addressed, along with challenges related to institutional hierarchies in adopting open-source collaboration structures.

COARA

SIS is coordinating CERN's participation in the [Coalition for Advancing Research Assessment \(CoARA\)](#). CoARA is an alliance of more than 600 organizations, aiming to reform research assessment on a global scale by committing signatory institutions to several [core principles](#). The CoARA commitments focus on basing research assessment primarily on qualitative judgment, supported by the responsible use of quantitative indicators. In addition, they aim at recognising a diverse spectrum of activities in research assessment, including open science and teaching activities.

In 2023, the SIS team worked in close collaboration with the CERN Experimental Physics and HR departments to coordinate the CoARA efforts at CERN. To align research assessment at CERN with the CoARA principles, the SIS team has started to develop an overview of assessment procedures in the institution. In this context, the CoARA principles have been compared to official HR documentation. Additionally, interviews conducted with members of hiring boards in the experimental and theoretical physics department have been conducted. So far, the investigation has shown that assessment practices at CERN largely agree with the CoARA principles. The recognition of open science, teaching and outreach activities has been identified as an area for further improvement.

In 2024, the CERN CoARA team will deepen its knowledge on assessment practices by conducting interviews with researchers in other CERN departments and develop a set of suggestions geared towards aligning research assessment at CERN with the CoARA principles. A publicly available action plan outlining CERN's current and future engagement with CoARA will be published in mid-2024.

OSPO LAUNCH

The Open Source Program Office (OSPO) was introduced as a new organization-wide initiative to enable consistent Open Source practices in the organization. While OSPOs are being more and more established in industry, CERN's OSPO goes beyond the standard by incorporating both Open Source software and Open Source hardware.

SIS was asked to guide the development of the mandate for an OSPO together with several departments, which was ultimately approved by the Enlarged Directorate in May 2023 and is [available online](#).

The launch event, held in November 2023, saw participation from over 200 individuals both onsite and online. Pippa Wells, Deputy Director for Research and Computing, opened the launch event with a welcome address. Keynote speeches were delivered by experts from organizations such as Nvidia, the Open Source Hardware Alliance, and the World Health Organization (WHO). The event was followed by a networking reception.

The event's detailed program including recordings of the keynotes, are available: <https://indico.cern.ch/event/1327562/> A community event the following day saw active engagement with numerous questions raised by attendees. A dedicated website was established to provide ongoing information and support for the OSPO initiative: <https://opensource.cern/>.

An additional, more technical website resource is being built to serve as a central hub for resources, updates, and



The OSPO Launch Event, November 2023

opportunities for engagement. The launch of the OSPO represents a significant step toward fostering collaboration and innovation within the organization

UNESCO OPEN SCIENCE OUTLOOK LAUNCH AT CERN: OPENING SCIENCE FOR ALL

CERN SIS partnered with colleagues at UNESCO to host and organize the global launch of the first UNESCO Open Science Outlook on December 14th, as a pre-event to the closing ceremony of the International Year of Basic Sciences for Sustainable Development. This gathering provided the ideal platform to launch Outlook and to discuss future actions to support equitable open sciences across the world in line with the 2021 UNESCO Recommendation on Open Science and following the CERN-NASA Summit on Open Science held at CERN in July 2023.

Alex Kohls, Group Leader of SIS, opened the event with remarks on how UNESCO and CERN both have had an impact on the global community and its policy building by leveraging their expertise in Open Science. Next the UNESCO Open Science Outlook was launched, and Tiffany Straza from UNESCO provided a summary of the findings of the report, providing a global overview of the state of open science as well as updates on the implementation of the 2021 UNESCO Recommendation on Open Science. She highlighted how the report evaluates the impact of the Recommendation, identifies challenges, and set the stage for future progress by sharing insights into open science practices.

A key finding of the Outlook highlighted that while a growing number of countries are embracing open science, the lack of equity in access to funding, skills, and tools has hindered its widespread implementation across the globe. On this theme, a panel of experts from around the world participated in a dialogue on equity in open science. This dialogue surfaced key concerns, and panelists stressed that current approaches to open science were resulting in unequal benefits, and in some cases, were even magnifying existing inequities. They stressed the need for more coordinated and globally approaches to open science as a matter of urgency

A detailed program and recordings are available at <https://indico.cern.ch/event/1349829/>



Panellists discuss equity in Open Science at the UNESCO Event at CERN in December 2023

PUBLISHING

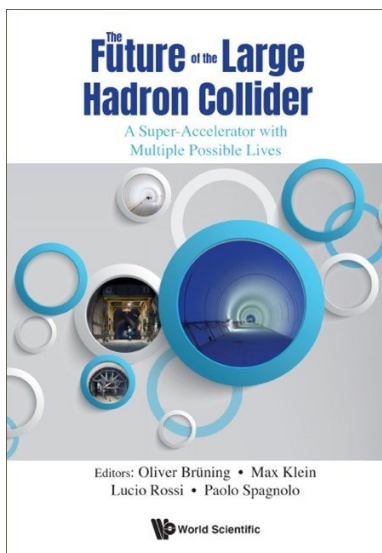
As no CERN schools could be organized during the 2020/2021 pandemic related restrictions, the CERN Reports series, better known as Yellow Reports, were significantly impacted. However, the situation is expected to quickly normalize and several proceedings and other reports are currently in the pipeline to be published in 2024. Notably, a major project in preparation is the proceedings of the [Joint University Accelerator School](#). The school will celebrate 30 years and a write-up of all the lectures—making up a total of ~1500 pages—will be published towards the end of 2024.



There is also a trend that CERN authors prefer to use commercial publishers to disseminate their monographs through the various open-access book programmes. SIS assists authors in establishing such contracts and is often involved in fact-finders throughout the authoring process, providing figures and illustrations, and verifying references and bibliographies before the manuscripts are handed over to the publishers.

During 2023 support has in particular been provided for the following books:

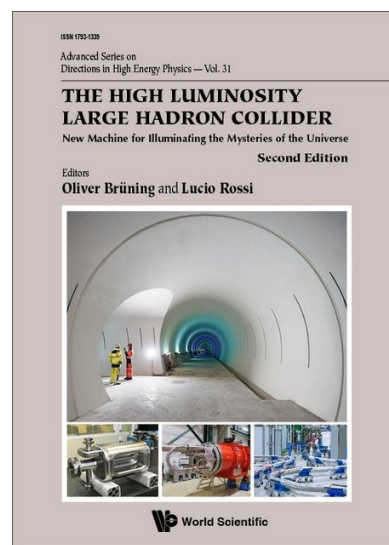
- *The future of the Large Hadron Collider: A super-accelerator with multiple possible lives*, edited by Oliver Brüning, Max Klein, Lucio Rossi, and Paolo Spagnolo, World Scientific, Singapore, November 2023, <https://doi.org/10.1142/13513>.



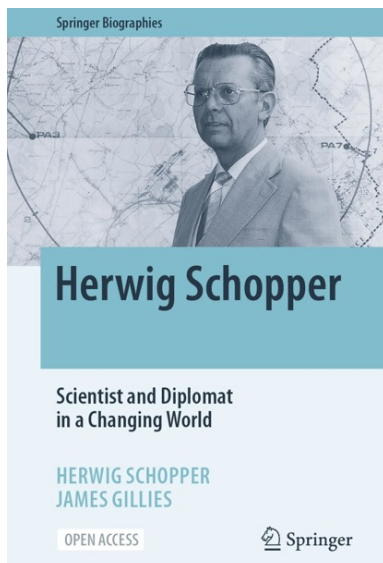
- *Big science, innovation, and societal contributions: The organisations and collaborations in big science experiments*, edited by Shantha Liyanage, Markus Nordberg, and Marilena Streit-Bianchi, Oxford Univ. Press, Oxford, March 2024, <https://catalogue.library.cern/literature/9j1mt-ewq70>



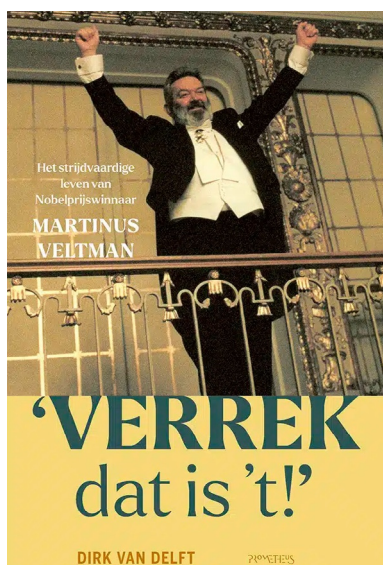
- *The High Luminosity Large Hadron Collider: New Machine for Illuminating the Mysteries of the Universe*, 2nd Edition, World Scientific, Singapore, March 2024, edited by Oliver Brüning (CERN, Switzerland) and Lucio Rossi (University of Milano, Italy & INFN, Italy), <https://doi.org/10.1142/13487>.



- *Herwig Schopper: Scientist and diplomat in a changing world*, Herwig Schopper and James Gillies, Springer, Cham, March 2024, <https://doi.org/10.1007/978-3-031-51042-7>



- *Verrek, dat is 't! Het strijdvaardige leven van Nobelprijswinnaar Martinus Veltman*, Dirk van Delft, Uitgeverij Prometheus, Amsterdam, February 2023, <https://uitgeverijprometheus.nl/boeken/verrek-dat-is-t-gebonden/>.



SCOAP³

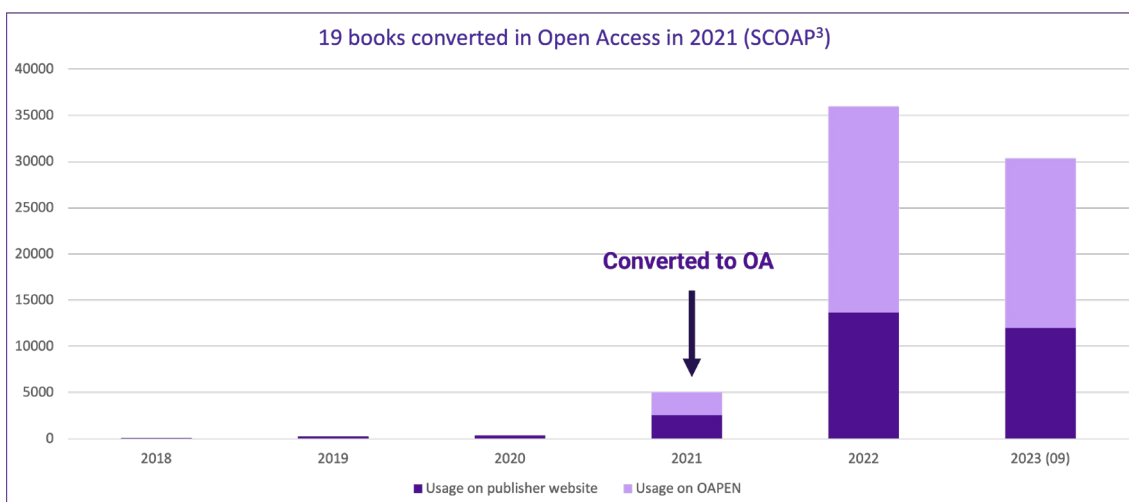
During the course of 2023, the Sponsoring Consortium for Open Access Publishing in Particle Physics (SCOAP³) - a collective action of over 3 000 member institutions across 45 countries/regions/territories - continued to deliver on its mission of achieving and sustaining equitable open access for research in high energy physics on a global scale. By the end of 2023, the Consortium marked a full decade of operations, during which it supported the open access publishing of over 62 250 articles across 11 leading journals in the discipline, covering over 90% of global research published in high-energy physics. This unprecedented disciplinary conversion to OA is particularly remarkable considering that the average investment per article for SCOAP³ across its history remains at 1 200 EUR, a mere fraction of the article level open access fees (APCs) charged by publishers.

In the past year, the principal goal of the SCOAP³ team in SIS was to implement the strategy for the upcoming Phase 4 (i.e. 2025-2027) as recommended by the strategic working group of experts sourced from across SCOAP³'s governance. Following extensive negotiations with participating publishers, the Phase 4 contracts will secure continued open access publishing for research in high-energy physics across leading journals in the discipline, and include a novel mechanism to provide financial incentives to participating publishers to improve aspects of their service which will advance open science adoption for the discipline. These service criteria include (but are not limited to): improved adoption of persistent identifiers (such as ORCIDs and RORs); software and dataset linking; enriched metadata; and improved accessibility standards to support the needs of those with disabilities. At the meeting of the SCOAP³ Governing Council in December 2023, the negotiated publisher contracts for Phase 4 and the associated total budget were unanimously approved by the collaboration's voting membership.

The SCOAP³ for Books Program continued to demonstrate its global impact by enabling the open access availability of books in high-energy physics and related fields. The pilot program (2021-2022) had targeted the conversion of existing (backlist) textbooks and monographs, and resulted in the conversion of more than 85 titles to open access. An analysis of the usage of a sample of the books from the pilot program demonstrated how open access availability has impacted their geographic use and visibility. The analysis showed that the content which was previously only available for reading at institutions in 14 countries, is now being accessed at over 160 countries with usage increasing by 10000%, following their conversion to open access.

In 2023, the SCOAP³ team implemented the revised strategy of the program approved by the Governing Council at the end of 2022, which shifted the focus of the program towards supporting the publishing of born open access books. The SCOAP³ team reported that the 2023 offering has resulted in the funding of 18 titles. These books, selected by a panel of expert researchers, will be made available in the SCOAP³ collection on the OAPEN Library.

The meeting of the Governing Council in December 2023 marked some changes in the governance of the initiative. Stefan Hohenegger from CNRS in France was appointed as Chair of the GC for a three-year term beginning in January 2024. The GC further voted to add two new members to the Executive Committee of SCOAP³: Mehmet Mirat Satoğlu from ULAKBIM, Türkiye, and Jiří Jiráť from the CzechELib National Centre, Czech Republic, each for a two-year term (twice renewable). Finally, on the completion of her three-year term as Chair of the GC, Clare Appavoo of CRKN in Canada, was warmly thanked by all the members for her many years of service to SCOAP³.



Evolution of usage statistics of sample of 19 books converted to Open Access by SCOAP³ in 2023

OUTLOOK

CERN70

The coming year will mark a milestone for CERN: the Organization will celebrate its 70th birthday. Of course, also for SIS, this is an important anniversary and the team will contribute to the festivities. In particular the Archives colleagues will work closely with the [CERN70](#) organising team to provide historical context and provide suggestions. The Open Science section will be involved in the anniversary project as a critical element of CERN's contributions to society.

COLLABORATION WITH OAPEN

SIS and the not-for-profit organization OAPEN Foundation will announce a further expansion of their collaboration to jointly promote open access to books. Since 2021, OAPEN helps CERN to disseminate books that are made available open access through the SCOAP³ for Books initiative. 2024 will now bring a significant expansion of the collaboration where CERN will use its extensive technical infrastructure to directly host both the [OAPEN Library](#) and the [Directory of Open Access Books \(DOAB\)](#). As such, OAPEN will join other scholarly communication services that are hosted or operated by CERN to serve the global community. [HEPdata](#), [INSPIREhep](#), and [Zenodo](#) are only some to name.

A FIRST OPEN SCIENCE REPORT

After the successful implementation of the new CERN Open Science governance framework, and numerous concrete open science initiatives, 2024 will be the year to start reviewing progress. The SIS team, together with all open science specialists at CERN, will start defining how to measure success in implementing the Open Science Policy. KPIs have to be defined and means to measure them established. Monitoring will be one component of an organizational Open Science Report, the first one to be published at the end of 2024. But of course, the report should not only read like a numbers dashboard. Concrete and lively success stories from all over the open science elements will hopefully make it an interesting document, not only for the open science community.



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