TWEPP-23

Topical Workshop on Electronics for Particle Physics

Geremeas, Sardinia, Italy, 2 – 6 October 2023

Local and scientific committee

Local organisation

A. Cardini (INFN Cagliari)
A. Lai (INFN Cagliari)
S. Cadeddu (INFN Cagliari)
G. Usai (Università & INFN Cagliari)
C. Cicalò (INFN Cagliari)
S. Siddhanta (INFN Cagliari)
G. M. Cossu (INFN Cagliari)
A. Loi (INFN Cagliari)
A. Lampis (INFN Cagliari)
M. Garau (INFN Cagliari)
M. G. Dessì (INFN Cagliari, Administration)
P. Musu (INFN Cagliari, Administration)
M. A. Lecca (INFN Cagliari, Administration)

Scientific organisation

A. Kluge (CERN, CH, Chair)
J.P. Cachemiche (CPPM–IN2P3, FR)
A. Cardini (INFN Cagliari, IT)
H. Chen (BNL, US)
S. Danzeca (CERN, CH)
M. French (RAL, UK)
P. Gui (SMU, US)
M. Hansen (CERN, CH)
C. G. Hu (IPHC-IN2P3, FR)
C. Joram (CERN, CH)
A. Lai (INFN Cagliari, IT)
A. Ricci (CERN, CH, Secretary)
A. Rivetti (INFN, IT)
W. Snoeys (CERN, CH)
F. Vasey (CERN, CH)
K. Wyllie (CERN, CH)

Agenda

- **TWEPP23 web page**
  - https://indico.cern.ch/e/twepp2023
- **Presentations start daily at 9:00**
  - **Invited/plenary presentations in**
    - Mistral Room
  - **Parallel sessions in**
    - Mistral Room
    - Sirocco Room
  - **Upload your presentations**
- **Poster sessions**
  - **Tue 13:40 – 15:20**
  - **Thu 17:40 – 19:00**
- **FPGA User groups**
  - **Mon 17:15 – 18:15**
- **Micro-electronics & link User group**
  - **Thursday 13:40 – 15:20**
- **Tutorial**
  - **Fri 14:00**
- **Reception**
  - **Mon 19:00 – 20:30**
- **Social activities**
  - **Wed 14:00**
- **Conference Dinner**
  - **Thursday 20:30**

Presentations

- 72 oral presentations
- 98 poster presentations
- 5 invited talks
- 235 registered attendees (indico)

Schedule 2023: Mon/Tue

Monday, 2.10.23

Start	End	Salle 1	Salle 2
9:00	9:16	Registration	
9:20	9:36	Registration	
9:40	9:56	Registration	
10:00		- Opening	
		A. Cardini Welcome 1	
		A. Cardini Welcome 2	
		A. Cardini Welcome 3	
	12:00	A. Cardini Welcome 4	
12:00	13:20	Break	
13:20	14:45	Break	
14:45	15:01	A. Rivetti - ASIC 1 100 Performance of H2GCROC3, the readout ASIC of SiPMs for the back hadronic sections of the CMS High Granularity Calorimeter.	C. Bedoya - Trigger 1 207 ~~Optimization of the Upgraded Timing Distribution System of the LHCb experiment at CERN~~
15:05	15:21	A. Rivetti - ASIC 2 192 First test results for ECON-T and ECON-D ASICs for CMS HGCAL	C. Bedoya - Trigger 2 169 Time and Clock Distribution Over a Hierarchy of Deterministic Optical Links
15:25	15:41	A. Rivetti - ASIC 3 59 Testing and characterisation of the prototype readout chip for the High-Luminosity LHC upgrade of the CMS Inner Tracker	C. Bedoya - Trigger 3 70 A demonstrator for a real-time AI-FPGA-based triggering system for sPHENIX at RHIC
15:45	16:15	Break	
16:15	16:31	- - ASIC 4 154 Design and characterization of RD53C production chips for ATLAS and CMS pixel upgrades at HL-LHC	A. Kluge - Trigger 4 194 Testing a Neural Network for Anomaly Detection in the CMS Global Trigger test crate during Run 3
16:35	16:51	- - ASIC 5 111 Performance of the COLUTA ADC ASIC for the ATLAS HL-LHC Liquid Argon Calorimeter Readout	A. Kluge - Trigger 5 157 Real time data processing with FPGAs at LHCb
16:55	17:11	- - ASIC 6 143 Chips for calibration of the ATLAS LAr calorimeter	A. Kluge - Trigger 6 81 A full-function Global Common Module (GCM) prototype for ATLAS Phase-II upgrade
17:15	19:00	FPGA UG (optional)	
		Reception	

Tuesday, 3.10.23

		Salle 1						Salle 2					
		Chair 1	Chair 2	Track	#	ID	Title	Chair 1	Chair 2	Track	#	ID	Title
9:00	9:16	M. French	-	ASIC	7	33	The Monolithic Stitched Sensor (MOSS) Prototype for the ALICE ITS3 and First Test Results	J. Alme	-	Logic	1	78	FLX-182, the hardware platform for ATLAS readout during High Luminosity LHC
9:20	9:36	M. French	-	ASIC	8	121	Validation of the 65 nm TPSCo CMOS imaging technology for the ALICE ITS3	J. Alme	-	Logic	2	156	The CMS HGCAL trigger data receiver
9:40	9:56	M. French	-	ASIC	9	25	Development of monolithic pixel sensor prototypes for the CEPC vertex detector	J. Alme	-	Logic	3	60	CMS Level-1 trigger Data Scouting firmware prototyping for LHC Run-3 and CMS Phase-2
10:00	10:30	Break											
10:30	11:15	A. Kluge	-	Invited	1		ctices in the verification of front-end readout ASICs for high-energy physics exp			speaker			Adi
11:20	11:36	D. Gascor	-	ASIC	10	152	Characterization of the ATLAS Liquid Argon Front-End ASIC ALFE2 for the HL-LHC upgrade	S. Baron	-	Logic	4	123	SystemC framework for architecture modelling of electronic systems in future particle detectors
11:40	11:56	D. Gascor	-	ASIC	11	113	Design and characterization of sub-10ps TDC ASIC in 28nm CMOS technology for future 4D trackers	S. Baron	-	Logic	5	37	Verification Environment for ALTIROC ASIC of the ATLAS High Granularity Timing Detector
12:00	12:16	D. Gascor	-	ASIC	12	49	Recent developments in the IGNITE project on front-end design in CMOS 28-nm technology	S. Baron	-	Logic	6	93	Model and analysis of the data readout architecture for the ITS3 ALICE Inner Tracker System
12:20	13:40	Break											
13:40	15:20	- - Poster 1											
15:20	15:36	P. Gui	-	ASIC	13	161	Digital on Top methodology for Monolithic Active Pixel Sensor, feedback from MIMOSIS sensors for CBM Micro-Vertex Detector	S. Baron	-	Logic	7	171	Towards Single-Event Upset detection in Hardware Secure RISC-V processors
15:40	15:56	P. Gui	-	ASIC	14	155	Tri-axis 5µm hexagon pixel-strip matrix combining 3*852 current comparator in a 180nm node	S. Baron	-	Logic	8	21	Fault Tolerance Evaluation Study of a RISC-V Microprocessor for HEP Applications
16:00	16:16	P. Gui	-	ASIC	15	162	Lab measurement of UKRI-MPW0 after irradiation: an HV-CMOS prototype detector with a large breakdown voltage	S. Baron	-	Logic	9	103	Integrating lpGBT into the Common Readout Units (CRU) of the ALICE Experiment
16:20	16:50	Break											
16:50	17:35	A. Kluge	-	Invited	2		PGA Firmware design with High Level Synthesis: Methodology, gains, and pitfal			speaker			Michalis Bachtis
17:40	17:56	P. Gui	-	ASIC	16	42	3D-integrated pixel circuit for a low power and small pitch SOI sensor	F. Vasey	-	Production	1	84	Reliability of Power Conversion Card for CMS MTD-BTL
18:00	18:16	P. Gui	-	ASIC	17	105	NAPA-P1: NANOSECOND TIMING PIXEL FOR LARGE AREA SENSORS	F. Vasey	-	Production	2	47	CMS ECAL VFE design, production and testing
18:16	19:00												
		Committee dinner											

Schedule 2023: Wed/Thu

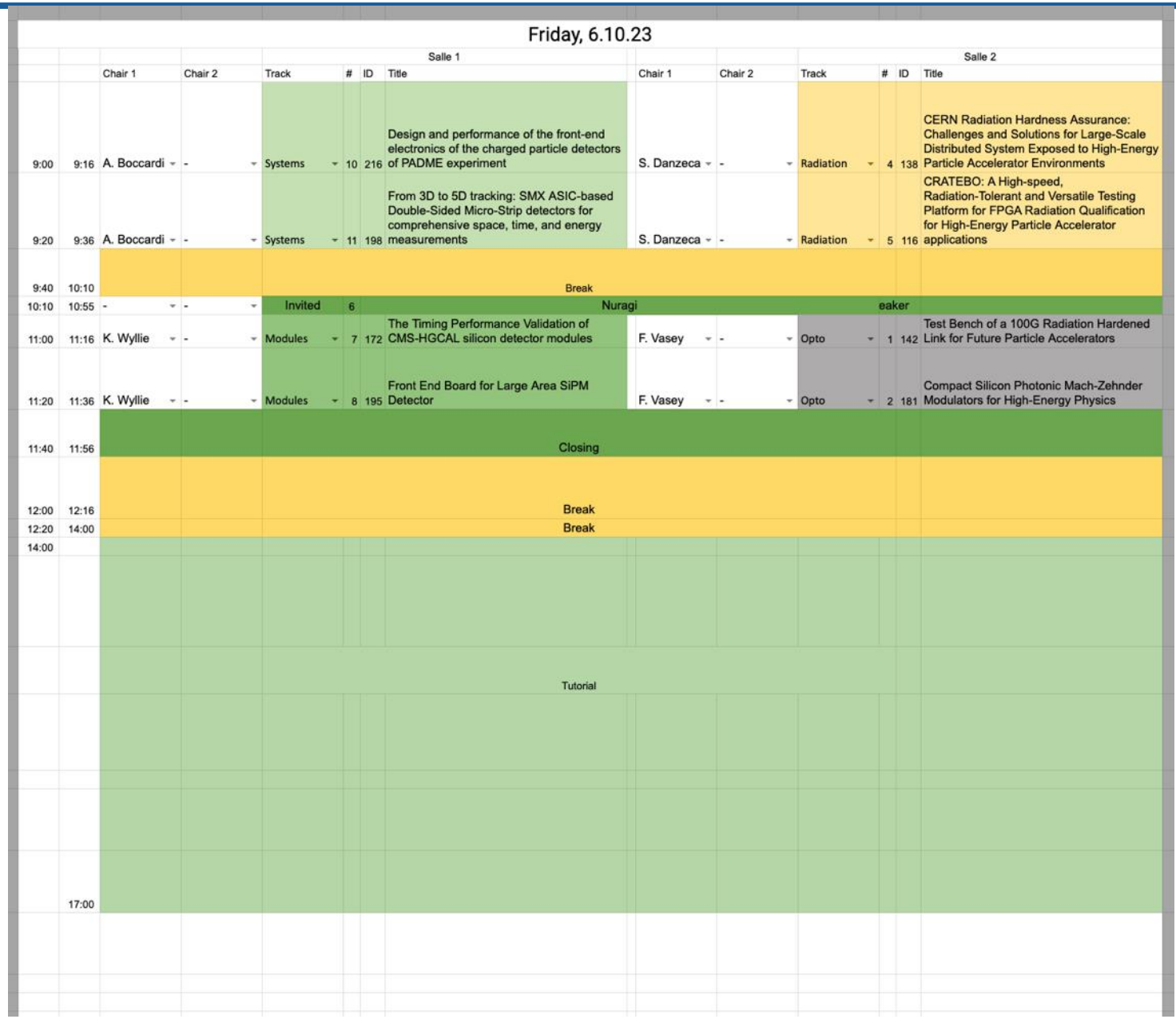
Wednesday, 4.10.23

Salle 1						Salle 2					
Chair 1	Chair 2	Track	#	ID	Title	Chair 1	Chair 2	Track	#	ID	Title
A. Lai	-	ASIC	18	225	A low crosstalk 768-channel of 14-bit analog to digital converters for high resolution array of detectors.	F. Vasey	-	Production	3	87	Reliability Run and Data Analysis of the Accelerated Aging of Present and Future Electrolytic Capacitors Installed in the Protection Systems of Superconducting Magnets of the Large Hadron Collider at CERN
A. Lai	-	ASIC	19	151	Dual use driver for high speed links transmitters in the future high energy physics experiments	F. Vasey	-	Production	4	160	Overview of the production and qualification tests of the lpGBT
A. Lai	-	ASIC	20	28	SET sensitivity study of a VCRO-based PLL for HL-LHC ATLAS HGTD	F. Vasey	-	Production	5	19	Hybrid designs and kick-off production experience for the CMS Phase-2 Upgrade
Break											
F. Vasey	-	Invited	3		:, differences, why do we need the different concepts, FCC/e+-/muon..., impact on			speaker			Dave Newbold
C. G. Hu	-	ASIC	21	126	Design and Characterization of a precision tunable time delay integrated circuit.	H. Chen	-	Power	1	7	Prototyping during pre-production: the re-design of ATLAS ITk strip tracker powerboards for the end-cap
C. G. Hu	-	ASIC	22	149	In-pixel AI for lossy data compression at source for X-ray detectors	H. Chen	-	Power	2	13	CMS Outer Tracker Phase-2 Upgrade on-module powering
C. G. Hu	-	ASIC	23	55	A simulation methodology for establishing IR-drop-induced clock jitter for high precision timing ASICs.	H. Chen	-	Power	3	68	NEW GENERATION B-FIELD AND RAD-TOLERANT DC/DC POWER CONVERTER FOR ON-DETECTOR OPERATION
Break											
Social activity											

Thursday, 5.10.23

Salle 1						Salle 2					
Chair 1	Chair 2	Track	#	ID	Title	Chair 1	Chair 2	Track	#	ID	Title
A. Boccardi	-	Systems	1	209	Design and implementation of the Hybrid Detector for Microdosimetry (HDM): Challenges in readout architecture and experimental results	K. Wyllie	-	Modules	1	186	Real-time Signal Processing and Data Acquisition for the Electric Field Detector (EFD-02) on the CSES-02 satellite
A. Boccardi	-	Systems	2	17	HEPS-BPIX40: the upgrade of the hybrid pixel detector for the High Energy Photon Source	K. Wyllie	-	Modules	2	206	The OBDT-theta board: time digitization for the theta view of Drift Tubes chambers.
A. Boccardi	-	Systems	3	95	A readout system based on SiPM for the dRICH detector at the EIC	K. Wyllie	-	Modules	3	85	The Trigger & Data Acquisition interface module of the Tile Calorimeter for the ATLAS Phase- II Upgrade
Break											
A. Kluge	-	Invited	4		Iter			speaker			Raphael
J.P. Cacher	-	Systems	4	26	ALICE ITS3: a bent stitched MAPS-based vertex detector	M. Hansen	-	Modules	4	218	Lessons from integrating CMS Phase-2 back-end electronics and first results from Serenity-S1, a production optimised ATCA blade.
J.P. Cacher	-	Systems	5	117	The LHCb VELO Upgrade II: design and development of the readout electronics	M. Hansen	-	Modules	5	228	Design, production and irradiation results of the new advanced front end electronics of CMS iRPC
J.P. Cacher	-	Systems	6	153	SciFi Front-End Electronics: Calibration and Results on detector performance	M. Hansen	-	Modules	6	174	Constant Fraction Discriminator for NA62 experiment at CERN
Break											
micro electronics UG & link UG											
H. Chen	-	Systems	7	204	Outer Barrel services chain characterization for the ATLAS ITk Pixel Detector	S. Danzeca	-	Radiation	1	144	Prototype measurement results in a 65nm technology and TCAD simulations towards more radiation tolerant monolithic pixel sensors
H. Chen	-	Systems	8	2	ATLAS LAr Calorimeter Commissioning for LHC Run-3	S. Danzeca	-	Radiation	2	71	Single Event Effects characterization of a commercial 28 nm CMOS technology
H. Chen	-	Systems	9	56	Cryogenic Charge Readout Electronics for the ProtoDUNE-II Program and DUNE	S. Danzeca	-	Radiation	3	112	Characteristics and total ionizing dose response of 22nm Fully Depleted Silicon-on-Insulator
Break											
H. Chen	-	Invited	5		liscovery of Cold Noise delayed the production of ATLAS ITk strip tracker modules			speaker			?
Poster 2											
Poster 2											
Poster 2											
Comittee Meeting 19:00 - 20:15											

Schedule 2023: Fri

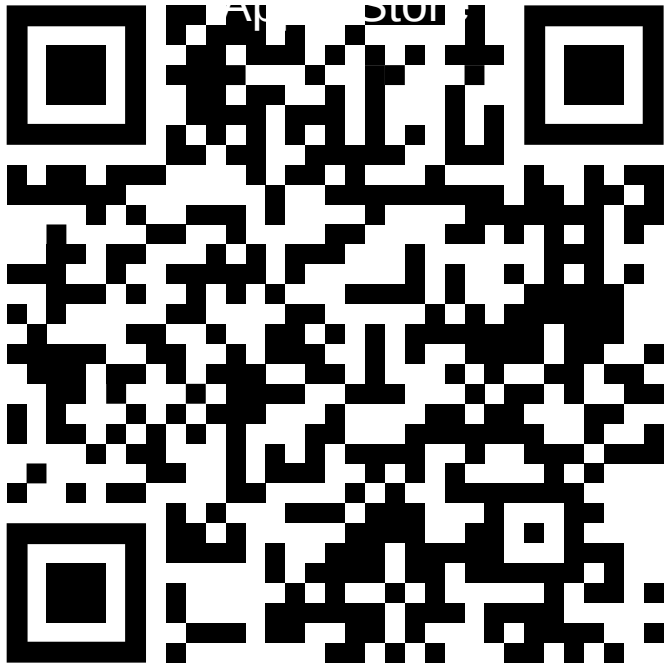


Friday, 6.10.23

		Salle 1						Salle 2					
		Chair 1	Chair 2	Track	#	ID	Title	Chair 1	Chair 2	Track	#	ID	Title
9:00	9:16	A. Boccardi	-	Systems	10	216	Design and performance of the front-end electronics of the charged particle detectors of PADME experiment	S. Danzeca	-	Radiation	4	138	CERN Radiation Hardness Assurance: Challenges and Solutions for Large-Scale Distributed System Exposed to High-Energy Particle Accelerator Environments
9:20	9:36	A. Boccardi	-	Systems	11	198	From 3D to 5D tracking: SMX ASIC-based Double-Sided Micro-Strip detectors for comprehensive space, time, and energy measurements	S. Danzeca	-	Radiation	5	116	CRATEBO: A High-speed, Radiation-Tolerant and Versatile Testing Platform for FPGA Radiation Qualification for High-Energy Particle Accelerator applications
9:40	10:10	Break											
10:10	10:55	-	-	Invited	6		Nuragi					eaker	
11:00	11:16	K. Wyllie	-	Modules	7	172	The Timing Performance Validation of CMS-HGCAL silicon detector modules	F. Vasey	-	Opto	1	142	Test Bench of a 100G Radiation Hardened Link for Future Particle Accelerators
11:20	11:36	K. Wyllie	-	Modules	8	195	Front End Board for Large Area SiPM Detector	F. Vasey	-	Opto	2	181	Compact Silicon Photonic Mach-Zehnder Modulators for High-Energy Physics
11:40	11:56	Closing											
12:00	12:16	Break											
12:20	14:00	Break											
14:00													
		Tutorial											
	17:00												

TWEPP23 HEPCon app

- **Mobile app → access to TWEPP schedule**
  - **Download app → Select TWEPP23 → Download data**



Poster sessions

Poster session

Invited talks

Invited talks

- **ITER**
  - Raphael Tieulent
- **FPGA Firmware design with High-Level Synthesis: Methodology, gains, and pitfalls**
  - Michalis Bachtis
- **Accelerator overview, outlook, different concepts**
  - Dave Newbold
- **Best practices in the verification of front-end readout ASICs for high-energy physics experiments**
  - Adithya Pulli
- **How the discovery of Cold Noise delayed the production of ATLAS ITk strip tracker modules by a year**
  - Ian Dyckes, Matthew Glenn Kurth

Tutorial

Tutorial

- **Digital Verification for FPGA and ASIC Designers**
  - **Dr David Long, Doulos**

Tracks

TWEPP tracks

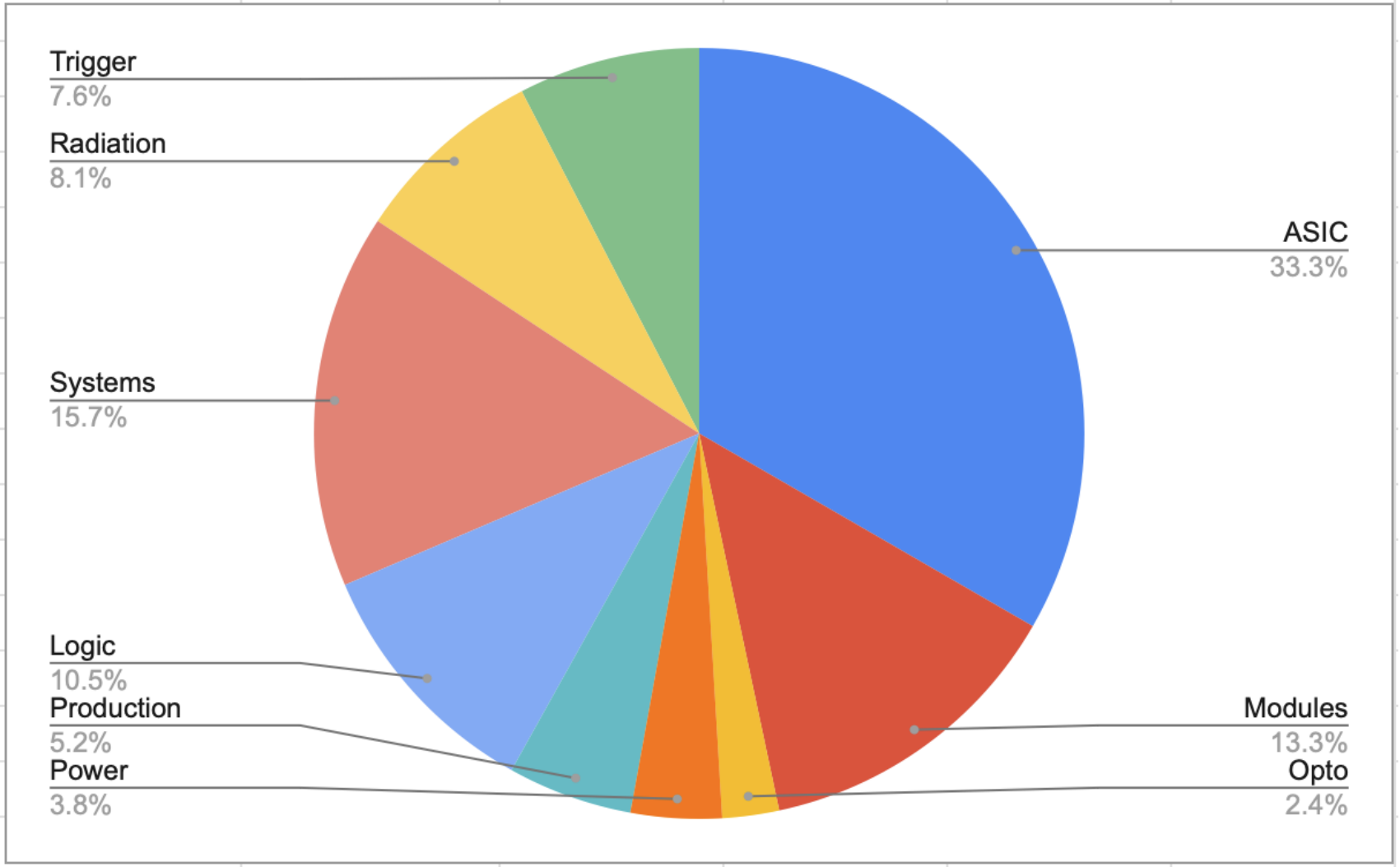
- ASIC
- Optoelectronics and (electrical data) Links
- Packaging and Interconnects
  - —> only 1 in 2023 → merged with Components
- Power, Grounding and Shielding
- Production, Testing and Reliability
- Radiation-Tolerant Components and Systems
- Programmable Logic, Design & Verification Tools and Methods
  - FPGA, System-on-chip, Design Tools, Verification methods, Logic, Algorithms
- NEW: PCB, module and component design/Modules
  - to distinguish from System descriptions
- System design, description & operation
  - Design, architecture, planning, installation, integration, commissioning and operation experience of systems
- Trigger and Timing Distribution
- Other

Real Time 24


IEEE NPSS NUCLEAR & PLASMA SCIENCES SOCIETY
ICISE CONFERENCE CENTER
April 22-26 2024
24th IEEE REAL TIME CONFERENCE
Quy Nhon, Vietnam
APPLICATIONS
High Energy Physics, Nuclear Physics, Nuclear Fusion, Nuclear Power Instrumentation, Astophysics and Astro-Particle Physics, Space Instrumentation, Medical Physics, General Radiation Instrumentation, Realtime Security and Safety.
TOPICS
• Data Acquisition Architectures
• Intelligent Signal Processing
• Front End Electronics and Fast Digitizers
• Trigger Systems and GPUs
• Fast Data Transfer Links and Networks
• Control, Monitoring, Test and Real Time Diagnostics Systems
• Data Processing Farms
• Real Time Simulation
• Web Applications for Physics
• Real Time AI and Machine Learning
• Emerging Technologies, New Standards, Feedback on Experiences
WORKSHOP/TUTORIALS
April 20-21, 2024
ORGANIZERS
Tran Thien Thanh
(Chair, University of Science – VNU-HCM)
David Abbott (CANPS Chair, Jefferson Lab)
Pierre-André Amaudruz (Program Chair, TRIUMF)
Keith Erickson (PPPL)
Martin Grossmann (PSI)
Vo Hong Hai (University of Science - VNU-HCM)
Ryosuke Itoh (KEK)
Patrick Le Du (CEA retired)
Zhen An Liu (IHEP Beijing)
Adriano Lucchetta (ISTP-CNR)
Masaharu Nomachi (Osaka University)
Riccardo Paoletti (INFN Pisa)
Martin Purschke (BNL)
Marc-Andre Tetrault (Universite de Sherbrooke)
Jean Tran Thanh Van (Rencontres du Vietnam)
Hoang Thi Kieu Trang (University of Science - VNU-HCM)
Stefan Ritt (PSI)
https://indico.cern.ch/e/rt2024
Stefan Ritt

Abstracts 2023

- **211 abstracts submitted → probably a new record**
  - **110 36-hours before deadline**



Oral Presentation award

Oral presentation awards

- Oral presentation award
- Friday, October 5, 11:00
- Referees
  - TWEPP scientific committee

TWEPP scientific Committee

A. Kluge (CERN, CH, Chair)
J. Alme (UiB, NO)
C. F. Bedoya (CIEMAT, ES)
A. Boccardi (CERN, CH)
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A. Rivetti (INFN, IT)
W. Snoeys (CERN, CH)
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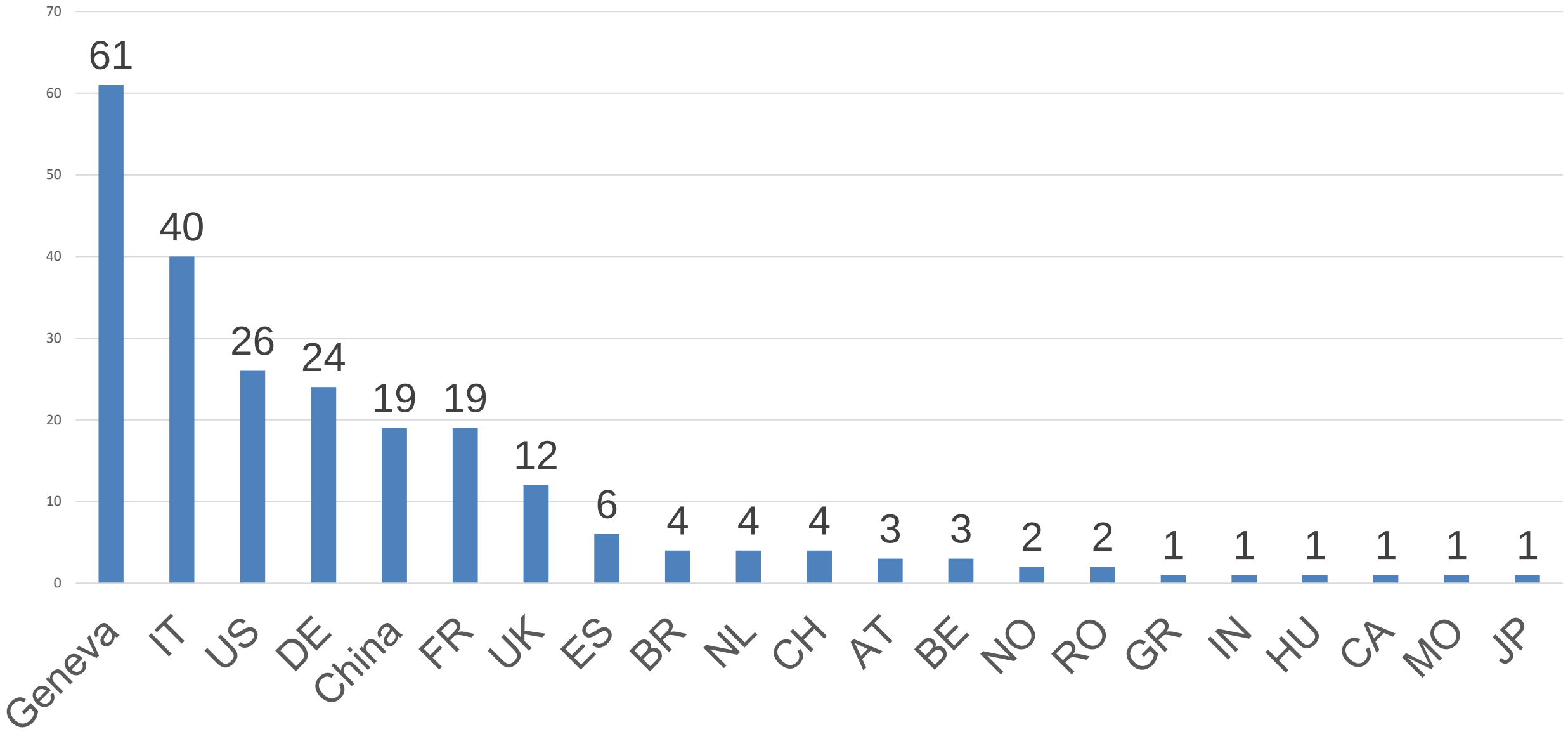
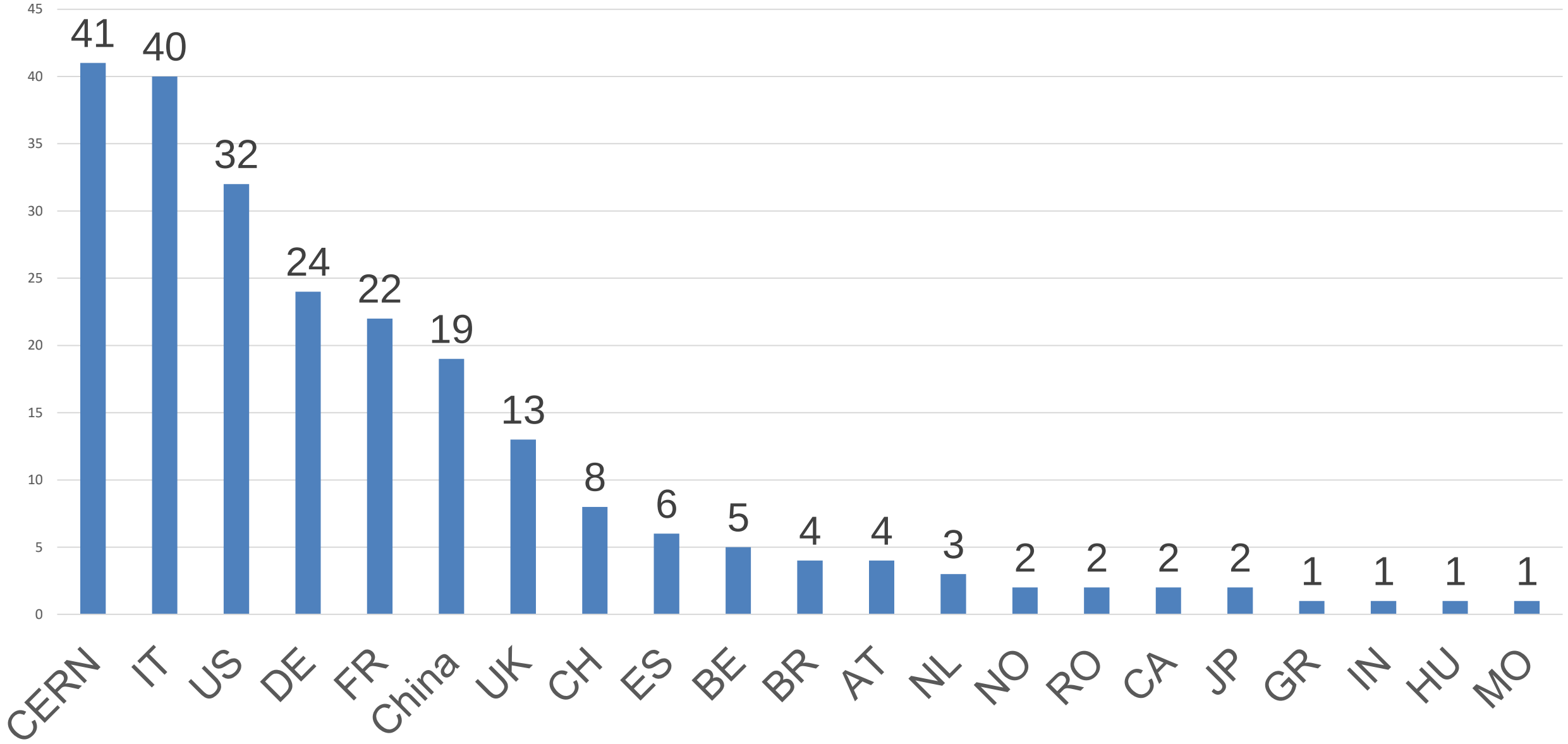
TWEPP23 attendees

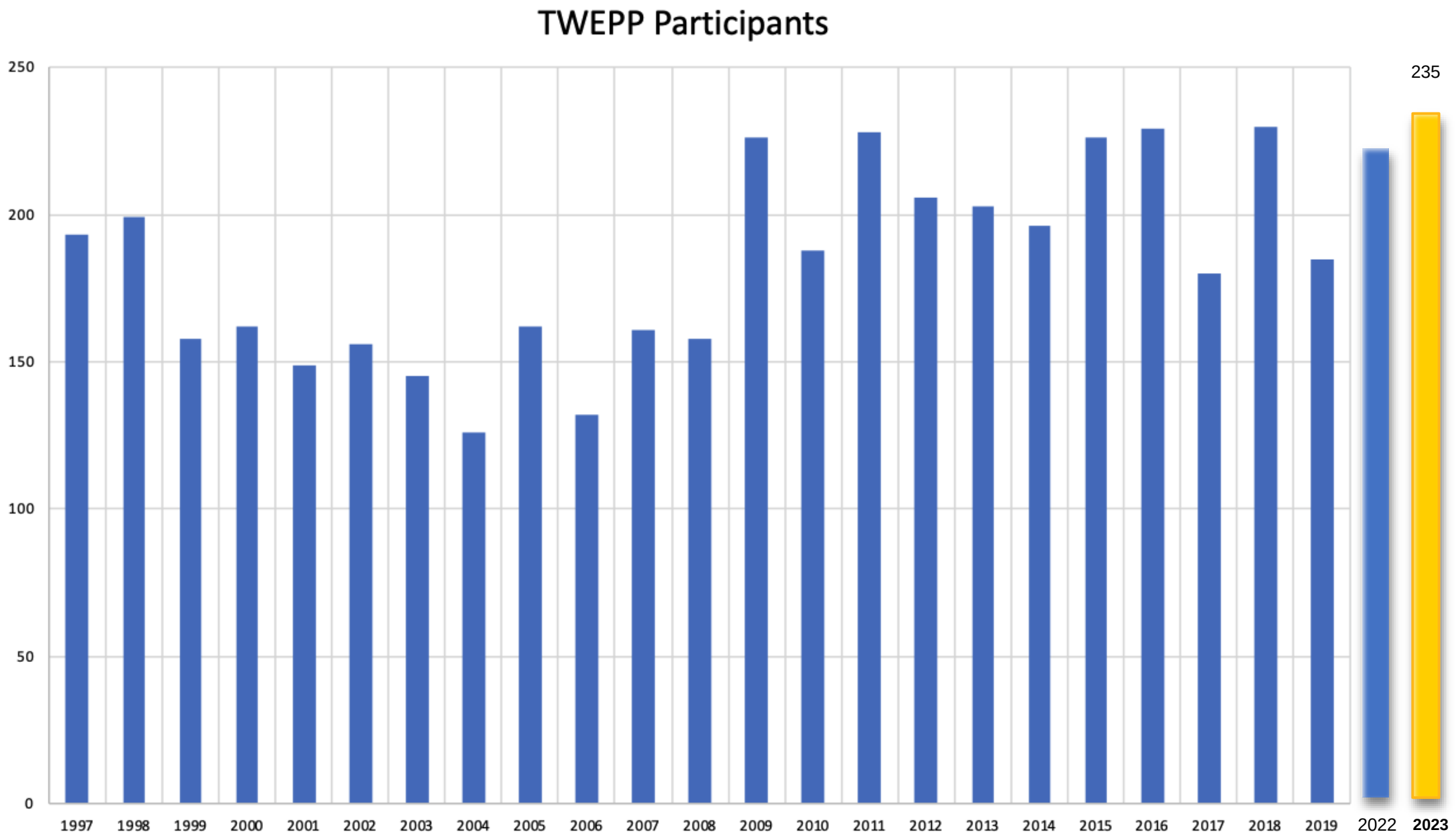
Attendees travel departure point (all indico 235 registered)



Home institute (all 235 indico registered)



TWEPP attendance over years



Proceedings

Proceedings

- **JINST - https://jinst.sissa.it/jinst/**
  - **submission using JINST web based infra structure**
  - **organized as non-open access, no cost for the author**
    - JINST offers open access, cost would need to be covered by author/institute/experiment
  - **each paper assigned to 2 referees**
    - from TWEPP scientific committee
    - https://indico.cern.ch/event/1255624/page/28782-twepp-scientific-committee
- **Length**
  - **number of pages must not exceed 5 pages**
    - **(excluding the title & abstract page & references)** for both oral and poster contributions
- **Deadline November 3, 2023 → no extension**
- **Instruction to authors**
  - **TWEPP web page**
    - https://indico.cern.ch/event/1255624/page/28781-proceedings-instruction-for-authors
  - **review will be strict**
    - 2 rounds of review
      - do not waste 1 round with insufficient formatting, structure and writing style

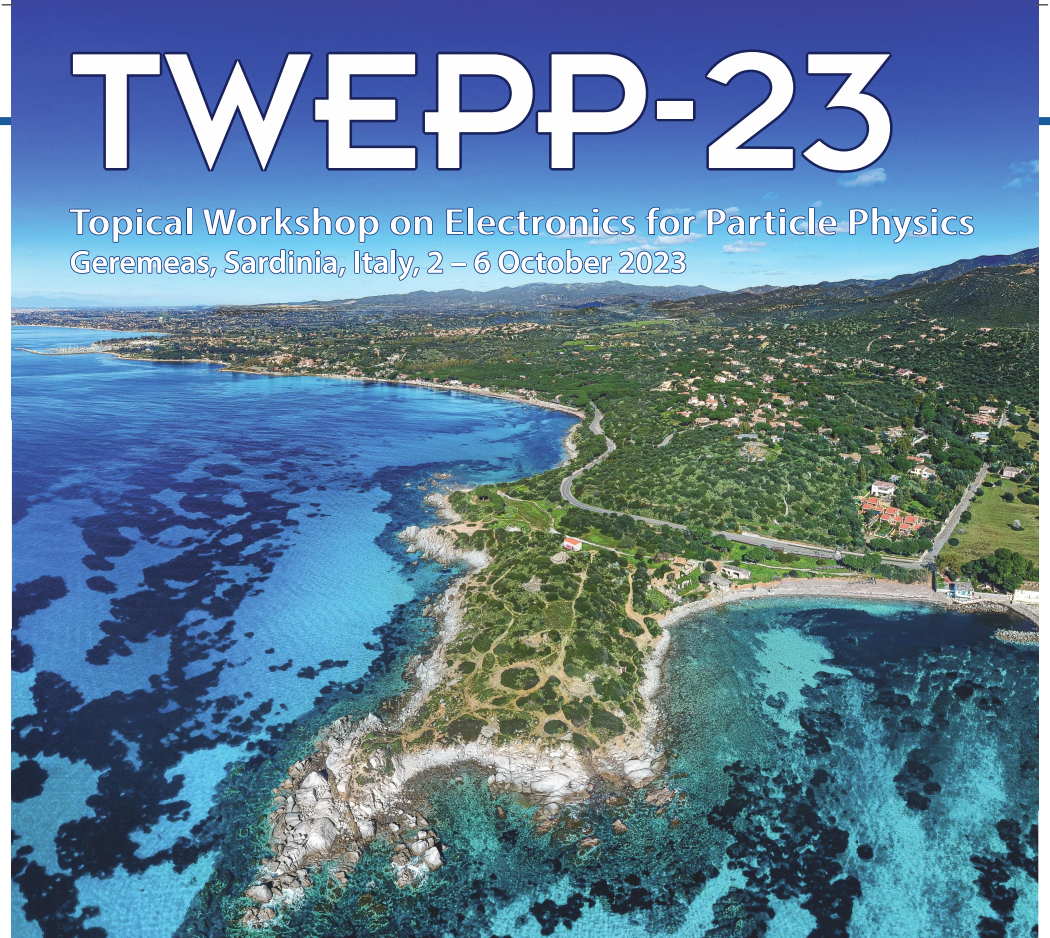
Proceeding recommendations

- Describe specifications and implementation challenges arising from these specifications
- Use quantitative (numbers) statements, comparisons and performance figures
  - and do not give statements that a given parameter needs to be high or low
- Limit introduction to relevant information to work you describe in the paper
  - Repetition of standards phrases about the LHC luminosity upgrade might only be useful if information is set in direct context to your work
- Describe work/challenge/complexity so that it can be understood by a scientist outside your field of competence
  - in contrast to writing an experiment collaboration note
- Describe why your work is worth being presented at a scientific/technical workshop
- Describe challenges/difficulties during implementation and how they were solved or why not
- Check quality of formatting, language and style

TWEPP-23

Topical Workshop on Electronics for Particle Physics

Geremeas, Sardinia, Italy, 2 – 6 October 2023



Deadline for abstracts: 30 April 2023

The workshop covers all aspects of electronic systems, components and instrumentation for particle and astro-particle physics such as: electronics for particle detection, triggering, data-acquisition systems, accelerator and beam instrumentation.

Operational experience in electronic systems and R&D in electronics for LHC, High Luminosity LHC, FAIR, neutrino facilities and other present or future accelerator projects are the major focus of the workshop.

For information
https://indico.cern.ch/e/twepp2023
https://twepp23.ca.infn.it/

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Organised by INFN, Istituto Nazionale di Fisica Nucleare, sezione di Cagliari and Università degli Studi di Cagliari with support from the European Organization for Nuclear Research (CERN).