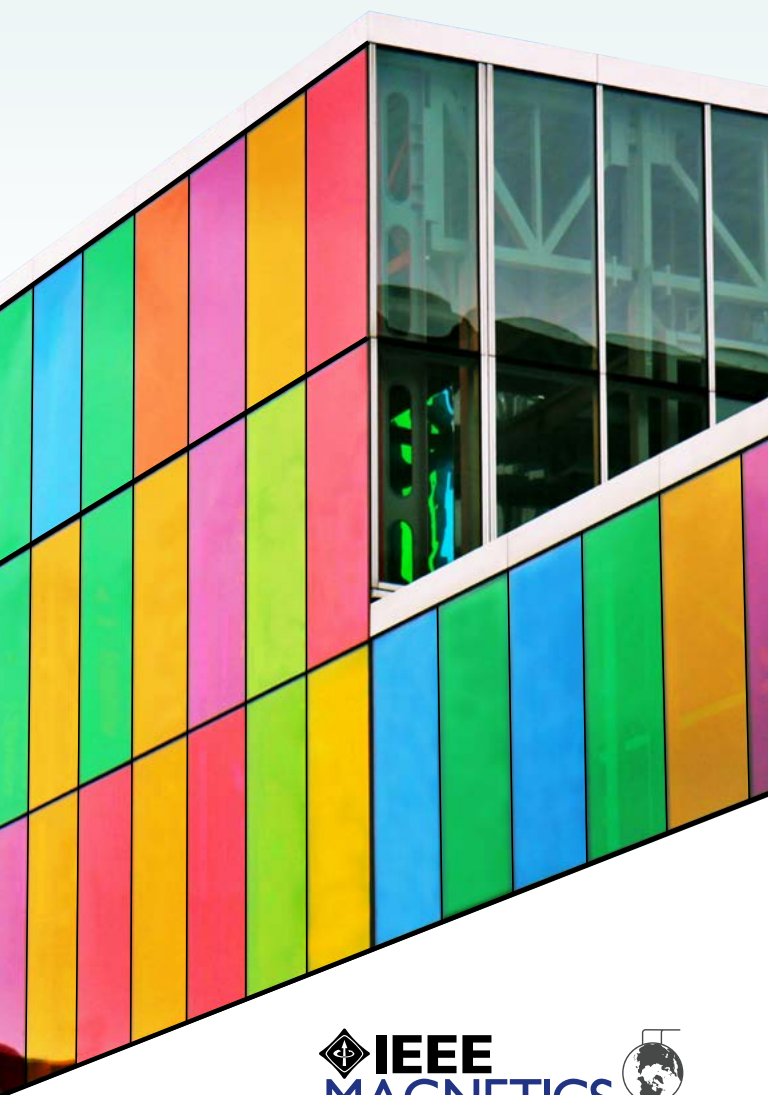


# INTERMAG AMERICAS 2020 PROGRAM BOOK



May 4-8 • Montréal, Canada



**IEEE**  
**MAGNETICS**



## TABLE OF CONTENTS

**General Conference Information.....ii**

**Exhibitors, Sponsors and Supporters .....xiii**

**Program-at-a-Glance .....xxii**

**Monday ..... 1**

**Tuesday ..... 1**

**Wednesday.....73**

**Thursday .....142**

**Friday .....209**

**Index .....259**

The 2020 INTERMAG Conference was due to be held at the Palais des congrès de Montréal in Québec, Canada, May 4-8, 2020. Unfortunately, a global pandemic occurred, due to the coronavirus disease COVID-19. The INTERMAG 2020 Management Committee monitored developments in January, February, and March with the health and safety of all our Conference participants as our top priority. Ultimately, due to travel bans, quarantines, and bans on large gatherings by the Canadian Government, we had no choice but to cancel. We exhausted all alternative options such as going virtual, postponing the Conference, or merging with another Conference before making the decision. We are very disappointed to not be able to provide you with the opportunity to come together and interact with, learn from, and be inspired by your colleagues this May in Montréal, but your health and ultimately that of all of our families, colleagues, and communities is absolutely paramount.

Lots of hard work went into the preparation for the 2020 INTERMAG Conference by many different people. We would like to start by thanking all the authors who submitted nominations and digests for INTERMAG 2020. From these, the INTERMAG 2020 Program Committee put together a very exciting main program, as can be seen in this draft. The presentations were selected from over 1,400 submissions distributed across 15 sorting categories. As usual for INTERMAG, electrical machines and drives proved to be the most popular, followed by spintronics and magnetization dynamics. The contributed program was accompanied by eight symposia and 52 single invited presentations, selected by the Program Committee from 20 and 166 nominations, respectively, across a very wide range of topics. The symposia focused on spintronics-based neuromorphic computing, the bench to bedside transition in biomagnetics, thermal effects in antiferromagnetic spintronics, soft magnetic materials for power conversion, magnetic nanoparticles for biomedical diagnostics and imaging, electrical machines and drives, 3D magnetism in curved geometries, and nano-scale propagating spin waves.

In addition, a number of events accompanied the main program. On the Monday afternoon, a tutorial was planned on Magnetism and the Environment. Oliver Gutfleisch (*Technical University of Darmstadt*) was to speak on Magnetic Refrigeration, Keisuke Fujisaki (*Toyota Technological Institute*) was to speak on Motors in Electric Vehicles,

and Kiril Mugerma (*Geomega Resources*) was to speak on Circular Economy for Magnetic Materials. A special session was planned on Tuesday evening on the Future of Helium, with a report on the state of the market from the US Government's Bureau of Land Management and another report on helium recycling technologies. A plenary session on Wednesday was planned to celebrate the 2020 IEEE Magnetics Society Award Winners, and the five students selected as Finalists for the Best Student Presentation Award. The 2020 IEEE Magnetics Society Awards winners were:

Achievement Award: Prof. Dr. Chia-Ling Chen (*John Hopkins University*): "For pioneering discoveries in magnetic materials, nanostructures, and spin phenomena; for training young researchers; and providing invaluable service to the community."

Early Career Award: Prof. Dr. Jean Anne Incorvia (*The University of Texas at Austin*): "For contributions to implementation of von Neumann and neuromorphic magnetic computing prototypes using spins in two-dimensional systems."

Distinguished Service Award: Dr. Gareth Hatch (*Technology Metals Research*): "In recognition of a decade of outstanding service as Editor of the Magnetics Society Newsletter, and in particular for transforming it into a modern and engaging communications vehicle that is available through multiple channels."

The five Finalists for Best Student Presentation were:

Viola Krizakova (*ETH Zurich*): Field-free spin-orbit torque switching in MTJs at sub-nm timescales.

Maxwell Li (*Carnegie Mellon University*): In situ Lorentz microscopy study of domain wall Skyrmions.

Niranjan Natekar (*University of Minnesota*): Analysis of Adjacent Track Erasure for HAMR Media.

Mara Strungaru (*University of York*): Simulations of magnetic relaxation using atomistic spin-lattice dynamic.

Shishun Zhao (*Xi'an Jiaotong University*): Ionic Liquid Gating Control Interfacial Magnetism.

At that time, we also planned to celebrate the 50<sup>th</sup> anniversary of the Nobel Prize to Louis Néel for the discovery

of antiferromagnetism. Ivan Schuller (*University of California at San Diego*) was to give what promised to be an exciting plenary talk celebrating the diverse uses of anti-ferromagnetic materials since 1970. Additional networking opportunities were planned, including two student “Meet the Experts and Speakers” on Tuesday and Thursday, a women in magnetism networking event on Tuesday evening, and a “Meet the Employers” poster session on Wednesday at lunch, and an early career session on “Spotting the Next Big Idea” followed by a networking event on Thursday evening. In addition, there were exhibits, and a number of social events including a Plenary Reception with the theme of “Taste of Montréal” and the ever-popular evening bierstubes to accompany the technical program.

The exciting program described above resulted from the efforts of a large team of people who volunteered their time to serve on the Management and Program Committee for the 2020 INTERMAG Conference. In particular, the three Program Co-Chairs: Johannes Paulides (*AE Group*), Tiffany Santos (*Western Digital*), and Kiyonori Suzuki (*Monash University*) presided over a Program Committee of over 90 members, carefully selected to represent the geographical, technical, gender, and career diversity of INTERMAG. The Program Committee then evaluated all the nominations and submitted digests, subjecting each to a rigorous review process, before crafting and scheduling the different sessions. The two Co-Treasurers, Kristen Buchanan (*Colorado State University*) and Mark Kief (*Seagate Technologies*), dealt with the numerous complications with US and Canadian banks, as well as mitigating the financial risk to the Conference and the IEEE Magnetics Society as COVID-19 escalated and they very efficiently oversaw the refund process after cancellation. Particular thanks are also due to the Publications Chair, Min-Fu Hsieh (*National Cheng Kung University*), and his team of editors: Alexandru Stancu, Amr Adly, Chunhua Liu, Ciro Visone, Dan Wei, David Dorrell, Hatem Elbidweihy, Dennis Leung, Frédéric Mazaleyrat, Gangping Ju, Hyunsoo Yang, Iulian Nistor, Johannes Paulides, Nicoleta Lupu, Philip Pong, Radhika Barua, Ron Jansen, Thierry Lubin, and Yacine Amara. Their work continues as they will still oversee the entire review and publication process for the rest of 2020. The staff at *IEEE Transactions on Magnetics* are also thanked, particularly Franklin Jones and Ron Goldfarb. The Exhibits Chair Jean Anne Incorvia (*University of Texas at Austin*), along with Exhibits Manager Jennifer Fiske, did a wonderful job soliciting both exhibitors and partners for the confer-

ence. The Student Events Chair Nicola Morley (*University of Sheffield*) oversaw the various student events, including topics and invitations, as well as the childcare grants. Thanks to Brian Kirby who oversaw the selection of the student presentation finalists. Last but not least, the Publicity Chair, Philip Pong (*University of Hong Kong*), was responsible for the FORC'd St. Joseph's Oratory and Montréal montage in the Conference logo, as well as the numerous advertisement options throughout the world, and his rapid posting of updates during the decision-making process on COVID-19.

Finally, on behalf of the entire 2020 INTERMAG Management Committee, we would like to thank the staff of Simply Vintage for the hard work and professionalism, especially Molly Bartkowski (Conference Manager), Regina Mohr (Abstracts/Publications Manager), Jennifer Fiske (Exhibits Manager), and Ashley Cesare (Registration). They worked diligently to mitigate the effects of COVID-19, such as re-negotiating contracts to reduce financial exposure and setting up remote registration, all while continuing their normal tasks. We would also like to thank Rudi Schaefer and Pallavi Dhagat of the IEEE Magnetics Society for all their input and support.

We hope to meet again at either MMM 2020 in November 2020 in Florida or at INTERMAG 2021 in April 2021 in France. Until then, we wish all the best for the entire magnetism community and hope that everyone remains healthy and safe!

**Cindi L. Dennis**

*National Institute of Standards and Technology*

*Gaithersburg, MD, USA*

General Chair, 2020 INTERMAG Conference

# GENERAL CONFERENCE INFORMATION

## SCOPE OF THE CONFERENCE

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INTERMAG 2020 is sponsored by the IEEE Magnetics Society. It is the premier Conference on all aspects of applied magnetism, bringing together international researchers with the latest developments in magnetism ranging from fundamental to applied aspects, including advances in magnetic recording, magnetic memory, spintronics, energy and power technologies, electrical machines and drivers, power electronics and electric drives, sensors, bio-magnetism, and the emerging fields of Internet-of-Things and smart living. Members of the international scientific and engineering communities interested in recent developments in fundamental and applied magnetism are invited to attend and contribute to the technical sessions. The technical program will include invited and contributed papers in oral and poster sessions and invited symposia with about 1200 presentations overall.

## SYMPOSIA

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There will be eight symposia during the Conference which consist entirely of invited talks by experts in the field.

<b>Tuesday</b> Morning	<b>AA</b>	Spintronics-Based Neuromorphic Computing
<b>Tuesday</b> Afternoon	<b>BA</b>	Bench to Bedside Transition of Biomagnetic Research: How Close Are We?
<b>Wednesday</b> Morning	<b>CA</b>	Thermal Effects in Antiferromagnetic Spintronics: from Actual Thermoelectric Effects to Thermally-Induced Magnetoelastic Artifacts
<b>Wednesday</b> Afternoon	<b>DA</b>	Soft Magnetic Materials and Components for Emerging Power Conversion
<b>Thursday</b> Morning	<b>EA</b>	Magnetic Nanoparticles for Biomedical Diagnostics and Imaging: Recent Advances and Perspective
<b>Thursday</b> Afternoon	<b>FA</b>	Electrical Machines and Drives 2020 and Beyond
<b>Friday</b> Morning	<b>GA</b>	Three-Dimensional Magnetism in Curved Geometries
<b>Friday</b> Afternoon	<b>HA</b>	Novel Approaches to the Excitation and Control of Nano-Scale Propagating Spin Waves

## PUBLICATIONS

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Authors of papers presented at the conference may submit a manuscript for publication in IEEE Transactions on Magnetics. The editorial process will be the same as for regular submissions to the journal. Accepted conference-related papers will be posted online with DOIs as “Early Access” and then published in final form as regular articles, not “conference papers,” in a special issue in late 2020. The authors of some papers not accepted for IEEE Transactions on Magnetics will be offered the opportunity to publish in IEEE Magnetics Society Conference Proceedings on IEEE Xplore.)

To check the status of their papers, authors should refer to the IEEE submission site at <https://mc.manuscriptcentral.com/transmag-ieee>.

## BEST STUDENT PRESENTATION AWARD

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The Best Student Presentation competition, sponsored by the IEEE Magnetics Society, recognizes and encourages excellence in graduate studies in the field of magnetism.

### Finalists:

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- AB-02**     ***In situ* Lorentz Microscopy Study of Domain Wall Skyrmions**  
Maxwell Li, *Carnegie Mellon University*
- AC-05**     **Ionic Liquid Gating Control Interfacial Magnetism**  
Shishun Zhao, *Xi'an Jiaotong University*
- BE-02**     **Simulations of Magnetic Relaxation Using Atomistic Spin-lattice Dynamic**  
Mara Strungaru, *University of York*
- BG-01**     **Analysis of Adjacent Track Erasure for HAMR Media**  
Niranjan Natekar, *University of Minnesota*
- CB-01**     **Field-free Spin-orbit Torque Switching in MTJs at Sub-nm Timescales**  
Viola Krizakova, *ETH Zurich*

### Congratulations to the Best Student Presentation Award Winner at the 2019 Joint MMM-Intermag Conference:

- CE-03**     **Single Domain Magnetoelastic Terfenol-D Microdisks for Particle and Cell Manipulation**  
Zhuyun Xiao, *University of California, Los Angeles*

## IEEE SUMMER SCHOOL ON MAGNETICS POSTERS

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These posters are designed and executed by two student groups from the 2019 IEEE Magnetics Society Summer School held in Richmond Virginia.

- AQ-03**     Investigation of the Ultra-Fast Spin Dynamics of the Half-Metallic Compensated Ferrimagnet  $Mn_3Al$
- EP-06**     Growth and Characterization of  $Mn_3SnN$  Thin Films

## BEST POSTER PRESENTATION AWARD

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A list of the Best Poster Award Winners from the 2019 MMM Conference and 2019 Joint-MMM Conference is available at [www.magnetics.org](http://www.magnetics.org).

## STUDENT TRAVEL SUPPORT

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Thanks to the support of the Magnetics Society, travel grants are offered to a limited number of students who are presenting their work at the Conference. Students who have not previously received a Magnetics Society travel grant are eligible for this program. Only one application per research group is accepted. Postdoctoral fellows and non-students are not eligible. To apply for a travel grant to attend a future Magnetics Society Conference, go to [www.magnetism.org](http://www.magnetism.org).

## CHILDCARE SUPPORT

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Childcare grants are offered to a limited number of attendees who are bringing young children to the Conference or who incur extra expenses in leaving their children at home. To apply for a child care grant to attend a future Magnetics Society Conference, go to [www.magnetism.org](http://www.magnetism.org).



## SOCIAL MEDIA

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Be sociable—share! #Intermag2020



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[www.facebook.com/Intermagconf](http://www.facebook.com/Intermagconf)

### FUTURE CONFERENCES

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#### **2020 Magnetism and Magnetic Materials Conference**

November 2-6, 2020, Palm Beach, FL

#### **2021 Intermag Conference**

April 26-30, 2021, Lyon, France

#### **2022 Joint MMM-Intermag Conference**

January 10-14, 2022, New Orleans, LA

#### **2022 Magnetism and Magnetic Materials Conference**

October 31-November 4, 2022, Minneapolis, MN

#### **2023 Intermag Conference**

May 15–19, 2023, Sendai, Japan

#### **2023 Magnetism and Magnetic Materials Conference**

October 30-November 3, 2023 Dallas, TX

## CONFERENCE ORGANIZATION

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### IEEE MAGNETICS SOCIETY ADVISORY COMMITTEE

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President..... Pallavi Dhagat

*(Term expiring December 31, 2020)*

President Elect ..... Masahiro Yamaguchi

Secretary/Treasurer ..... Atsufumi Hirohata

Past President..... Manual Vazquez

#### **Committee Members** *(Term expiring December 31, 2020):*

Cindi Dennis, Peter Fischer, Simon Greaves, Mathias Kläui, June Lau, Hans Nembach, Teruo Ono, Thomas Thomson

#### **Committee Members** *(Term expiring December 31, 2021):*

Elke Arenholz, David Jiles, Olga Kazakova, Nicoleta Lupu, Katsuji Nakagawa, Johannes Paulides, Günter Reiss, Shinji Yuasa

#### **Committee Members** *(Term expiring December 31, 2022):*

Giovanni Finocchio, Jean Anne Incorvia, Galina Kurlyandskaya, Kenji Nakamura, Hendrik Ohldag, Lucian Prejbeanu, Montserrat Rivas, Yukiko Takahashi

### CONFERENCE MANAGEMENT COMMITTEE

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General Chair ..... Cindi Dennis

Co-Treasurers..... Kristen Buchanan  
and Mark Kief

Program Co-Chairs ..... Johannes Paulides, Tiffany Santos, & Kiyonori Suzuki

## Program Committee Members:

1. **Spintronics – Fundamentals and Applications**
  - Sebastien Couet, Shunsuke Fukami, *Virat Mehta*, Chando Park
  - *Vincent Baltz*, Andy Kent, Tsuyoshi Kondo, James Lourembaum
  - Tamalika Banerjee, *Connie Li*, Ilya Krivorotov, Aurelien Manchon
2. **Life Sciences Applications**
  - *Ravi L. Hadimani*, *Nikorn Pothayee*, Montserrat Rivas, Marija Torija
3. **Electric Machines, Drives, Control and Transformers**
  - *Yacine Amara*, Bruno Dehez, Prof Giannacopoulos, Thierry Lubin
  - Ningning Chen, Yang Huan, Kaiyuan Lu, Somporn Ruangsinchaiwanich
  - Kais Atallah, *Jen-Yuan (James) Chang*, Anis Smara, Rong-Jie Wang
  - Amr Adly, *Hatem Elbedweihy*, Min-Fu Hsieh, Will Robertson
  - Bi Chao, Narayan Kar, Jiang, Quan, *Parag Upadhyay*
  - *Johnathan Bird*, Yang Huan, Siu-Wing Or, MiChing Tsai
4. **Electric Drive Applications, Monitoring, and Transformers**
  - *Jang-Young Choi*, Vincent Mazauric, Yu-seop Park, Fei Zhao
  - Mochimitsu Komori, Kazuhiro Muramatsu, Shuangxia Niu, *Paul Ohodnicki*
  - Yasushi Endo, Chunhua Liu, Shunsuke Ohashi, *Ciro Visone*
5. **Magnetic Recording**
  - Simon Greaves, *Stephanie Hernandez*, Kumar Srinivasan, Tom Thomson
6. **Sensors and High-Frequency Devices**
  - Feiming Bai, Jeff Childress, Bijoy K. Kuanr, *Guoxing Miao*
7. **Multi-Functional Magnetic Materials and Applications**
  - *Zsolt Gercsi*, Julia Lyubina, Bethanie Stadler
8. **Magneto-electronic Materials and Phenomena**
  - *Michelle Jamer*, Bhagwati Prasad
  - *Steven Bennett*, Joe Davies, Jean-Baptiste Moussy
9. **Magnetization Dynamics and Micromagnetics**
  - Marius Costache, *Hans Nembach*, Jakob Wolawski
  - *Olle Heinonen*, Yaowen Liu, Simone Pisana
10. **Fundamental Properties and Cooperative Phenomena**
  - Solveig Felton, *Durga Paudyal*, Xiaolin Wang
11. **Soft Magnetic Materials**
  - Naoki Ito, Ivan Skorvanek, *Matthew Willard*
12. **Hard Magnetic Materials**
  - Nora Dempsey, *Arjun Pathak*, Jinbo Yang
  - Kunihiro Koike, *Ping Liu*, Thomas Woodcock
13. **Structured Materials**
  - Sang Ho Lim, *Melissa Loving*, Taro Nagahama, John Philip

**14. Microscopy, Imaging and Characterization**

- Kanta Ono, Elio Périgo, *Chengjun Sun*

**15. Interdisciplinary and Emerging Topics**

- *Susana Cardoso de Freitas*, Ruy Sanz González, Philip W. T. Pong, Cândid Reig, Oliver Sandig

Publications Chair..... Min-Fu Hsieh

Editors..... Amr Adly, Yacine Amara, Radhika Barua, David Dorrell, Hatem Elbidweihi, Ron Jansen, Gangping Ju, Dennis Leung, Thierry Lubin, Nicoleta Lupu, Chunhua Liu, Frédéric Mazaleyrat, Iulian Nistor, Johannes Paulides, Philip Pong, Alexandru Stancu, Ciro Visone, Dan Wei, Hyunsoo Yang

Editor, *IEEE Transactions*

on *Magnetics*..... Pavel Kabos

Exhibits Chair..... Jean Anne Incorvia

Publicity Chair..... Philip Pong

Student Events and Awards Chair..... Nicola Morley

Magnetics Society Representative.... Rudolf Schäfer

Conference Manager..... Molly Bartkowski

Abstracts/Publications Manager..... Regina Mohr

Exhibits Manager..... Jennifer Fiske

Registration Manager..... Ashley Cesare

**ADDITIONAL INFORMATION**

To join our mailing list, please visit [www.intermag2020.com](http://www.intermag2020.com) or contact [info@intermag2020.com](mailto:info@intermag2020.com).

# CONFERENCE PROGRAM-AT-A-GLANCE

MONDAY, MAY 4, 2020

2:30 pm to 5:00 pm

TU Tutorial on Magnetism and the Environment 517 A

TUESDAY, MAY 5, 2020

8:30 am to 11:30 am • Oral Sessions

AA Spintronics-Based Neuromorphic Computing 520 BC

AB Domains and Domain Wall Devices 520 DE

AC Multiferroics and Magnetoelectric Phenomena 518 BC

AD Permanent Magnet Design and Control for Motors 519 A

AF Magneto-Caloric Materials and Devices I 520 A

AG Recording Media, Interfaces, Channels,  
and All-Optical Recording 520 F

AH Interdisciplinary Magnetism I 518 A

9:00 am to 12:00 pm • Poster Sessions 517 CD

AP Biomagnetism I

AQ Magnetization Dynamics and Domain Walls

AR Structured Materials: Thin Films and Surface Effects I

AS Fundamental Properties and Cooperative Magnetism

AT Hard Magnetic Materials Design I

AU Control, Modeling, and Enabling Materials  
for Soft Magnetic Components

AV Special Rotating Electrical Machines I

AW Electric Machine Controls, Drives and Characterization

1:30 pm to 4:30 pm • Oral Sessions

BA Bench to Bedside Transition of Biomagnetic  
Research: How Close Are We? 520 BC

BB Topological Materials Spintronics 520 DE

BC Magnetoresistance in Heterostructures 518 BC

BD Linear Motor, Short and Long Stroke  
Actuators and Applications I 519 A

BE Magnetization Dynamics and Ultrafast Processes 519 B

BF Structured Materials: Thin Films  
and Surface Effects II 520 A

BG Heat Assisted Magnetic Recording 520 F

BH Transformers, Inductors, Magnetic Levitation I 518 A

2:00 pm to 5:00 pm • Poster Sessions 517 CD

BP Magnetic Textures and Spin-Orbitronics

BQ Magnonics and Spin Waves

BR Magneto-Elastic Materials and Devices I

BS Amorphous, Nanocrystalline, and Nanoparticle Soft Magnets

BT Crystalline Alloy and Garnet Soft Magnets

BU Special Rotating Electrical Machines II

BV Special Rotating Electrical Machines III

BW Permanent Magnet Design

6:00 pm to 8:00 pm

XA Evening Session on the Future of Helium 517 A

**8:30 am to 11:30 am • Oral Sessions**

<b>CA</b>	Thermal Effects in Antiferromagnetic Spintronics: from Actual Thermoelectric Effects to Thermally-Induced Magnetoelastic Artifacts	<i>520 BC</i>
<b>CB</b>	Spin Orbit Torque	<i>520 DE</i>
<b>CC</b>	Magnetism in Complex Oxides and Heusler Materials Systems	<i>518 BC</i>
<b>CD</b>	Permanent Magnet Machines I	<i>519 A</i>
<b>CE</b>	Magnons, Magnonic Lattices and Crystals	<i>519 B</i>
<b>CF</b>	Amorphous and Nanocrystalline Soft Magnets	<i>520 A</i>
<b>CG</b>	Magnetic Microscopy and Imaging	<i>520 F</i>
<b>CH</b>	Fundamental Magnetism	<i>518 A</i>

**9:00 am to 12:00 pm • Poster Sessions** *517 CD*

<b>CP</b>	Biomedical Diagnostics and Therapy I
<b>CQ</b>	Structured Materials: Nanoparticles and Nanostructures
<b>CR</b>	Magnetic Field Sensors (Non-Recording) I
<b>CS</b>	Magnetic Recording
<b>CT</b>	Design and Characterization of Electrical Machines
<b>CU</b>	Advances in (Semi)-Analytical Techniques for Design
<b>CV</b>	Advances in (Semi)-Analytical and Numerical Techniques for Design I
<b>CW</b>	Transformers, Inductors, Magnetic Levitation II

**1:30 pm to 4:30 pm • Oral Sessions**

<b>DA</b>	Soft Magnetic Materials and Components for Emerging Power Conversion Applications	<i>520 BC</i>
<b>DB</b>	Spins in Graphene and 2D Materials	<i>520 DE</i>
<b>DD</b>	Generators, Electrical Energy Storage and Energy Harvesting I	<i>519 A</i>
<b>DE</b>	Magnetization Dynamics in MTJ and STO devices	<i>519 B</i>
<b>DF</b>	Structured Materials: Exchange Bias and Heterostructures	<i>520 A</i>
<b>DG</b>	High-Frequency Devices and Applications I	<i>520 F</i>
<b>DH</b>	Cooperative Magnetism	<i>518 A</i>

**4:00 pm to 5:30 pm**

<b>YA</b>	Awards & Plenary: Antiferromagnetism: Celebrating 50 years since the Nobel Prize	<i>517 A</i>
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**8:30 am to 11:30 am • Oral Sessions**

<b>EA</b>	Magnetic Nanoparticles for Biomedical Diagnostics and Imaging: Recent Advances and Perspectives	<i>520 BC</i>
<b>EB</b>	Skyrmions and Spin-Orbitronics I	<i>520 DE</i>
<b>EC</b>	Voltage Control of Magnetism	<i>518 BC</i>
<b>ED</b>	Special Machines Design and Analysis	<i>519 A</i>
<b>EE</b>	Magnons and Spin Waves	<i>519 B</i>
<b>EF</b>	Magneto-Elastic Materials and Devices II	<i>520 A</i>
<b>EG</b>	Instrumentation and Measurement Techniques	<i>520 F</i>
<b>EH</b>	Fundamental Properties and Cooperative Phenomena	<i>518 A</i>

**9:00 am to 12:00 pm • Poster Sessions***517 CD*

<b>EP</b>	Antiferromagnetic Spintronics I
<b>EQ</b>	Micromagnetics, Computational Methods, Reversal and Hysteresis Modeling
<b>ER</b>	Interdisciplinary Magnetism II
<b>ES</b>	Hard Magnetic Materials Design II
<b>ET</b>	Electric Machines, Drives and Applications I
<b>EU</b>	Permanent Magnet Machines II
<b>EV</b>	Permanent Magnet Machines III
<b>EW</b>	Linear Motor, Short and Long Stroke Actuators and Applications II

**1:30 pm to 4:30 pm • Oral Sessions**

<b>FA</b>	Electrical Machines and Drives 2020 and Beyond	<i>520 BC</i>
<b>FB</b>	Spin Current and Spin Hall effect	<i>520 DE</i>
<b>FC</b>	MTJ Based Neuromorphic and Logic Devices	<i>518 BC</i>
<b>FE</b>	Micromagnetics, Spin Wave, and Magnetization Dynamics Modeling	<i>519 B</i>
<b>FF</b>	Structured Materials: Nanoparticles and Nanostructured Materials	<i>520 A</i>
<b>FG</b>	Rare-Earth and Other Hard Magnetic Materials	<i>520 F</i>
<b>FH</b>	Magnetic Field Sensors (Non-Recording) II	<i>518 A</i>

**2:00 pm to 6:00 pm • Poster Sessions***517 CD*

<b>FP</b>	Advanced Spintronic Materials and Devices
<b>FQ</b>	2D / Topological Materials and Spin Orbit Torque
<b>FR</b>	Magneto-Caloric Materials and Devices II
<b>FS</b>	Microscopy, Imaging, and Characterization
<b>FT</b>	Transformers, Inductors, Magnetic Levitation III
<b>FU</b>	Electric Machines, Drives and Applications II
<b>FV</b>	Design and System Control for Permanent Magnet Rotating Machines I
<b>FW</b>	Design and System Control for Permanent Magnet Rotating Machines II

**8:30 am to 11:30 am • Oral Sessions**

<b>GA</b>	Three-Dimensional Magnetism in Curved Geometries	520 BC
<b>GB</b>	Skyrmions and Spin-Orbitronics II	520 DE
<b>GC</b>	STT-MRAM and Related Devices	518 BC
<b>GD</b>	Power Electronics, Drives and Controls	519 A
<b>GE</b>	Magnetization Dynamics and Damping	519 B
<b>GF</b>	Biomedical Diagnostics and Therapy II	520 A
<b>GG</b>	Rare-Earth-Free Hard Magnetic Materials	520 F
<b>GH</b>	Design, Modeling, and Enabling Materials for Magnetic Components	518 A

**9:00 am to 12:00 pm • Poster Sessions**

517 CD

<b>GP</b>	Multiferroics and Voltage Controlled Phenomena
<b>GQ</b>	High-Frequency Devices and Applications II
<b>GR</b>	Novel Magnetic Properties and Systems
<b>GS</b>	Design and System Control for Permanent Magnet Rotating Machines III
<b>GT</b>	Design and System Control for Permanent Magnet Rotating Machines IV
<b>GU</b>	Permanent Magnet Machines IV
<b>GV</b>	Permanent Magnet Machines V
<b>GW</b>	Permanent Magnet Machines VI

**1:30 pm to 4:30 pm • Oral Sessions**

<b>HA</b>	Novel Approaches to the Excitation and Control of Nano-Scale Propagating Spin Waves	520 BC
<b>HB</b>	Antiferromagnetic Spintronics II	520 DE
<b>HC</b>	Magneto-Resistance Effects in Novel Material Systems	518 BC
<b>HE</b>	Magnetization Dynamics	519 B
<b>HF</b>	Biomagnetism II	520 A
<b>HG</b>	Rare-Earth Based Permanent Magnets	520 F
<b>HH</b>	Advances in (Semi)-Analytical and Numerical Techniques for Design II	518 A