

# Instrumentation Frontier Conveners Meeting

April 14, 2020

Phil Barbeau (Duke), Petra Merkel (Fermilab), Jinlong Zhang (Argonne)

# Community Contribution

- **Letters of Interest (submission period: April 1, 2020 – August 31, 2020)**
  - Letters of interest allow Snowmass conveners to see what proposals to expect and to encourage the community to begin studying them. They will help conveners to prepare the Snowmass Planning Meeting that will take place on November 4 - 6, 2020 at Fermilab. Letters should give brief descriptions of the proposal and cite the relevant papers to study. Instructions for submitting letters are available at <https://snowmass21.org/loi>. Authors of the letters are encouraged to submit a full writeup for their work as a contributed paper.
- **Contributed Papers (submission period: April 1, 2020 – July 31, 2021)**
  - Contributed papers will be part of the Snowmass proceedings. They may include white papers on specific scientific areas, technical articles presenting new results on relevant physics topics, and reasoned expressions of physics priorities, including those related to community involvement. These papers and discussions throughout the Snowmass process will help shape the long-term strategy of particle physics in the U.S. Contributed papers will remain part of the permanent record of Snowmass 2021. Instructions for submitting contributed papers are available at <https://snowmass21.org/submissions/>.
- Sent to
  - [snowmass@fnal.gov](mailto:snowmass@fnal.gov) (419 members)
  - [snowmass-young@fnal.gov](mailto:snowmass-young@fnal.gov) (427 members)
  - [hef-theory@slac.stanford.edu](mailto:hef-theory@slac.stanford.edu) (theorists)
  - Slack
  - DPF Webpage
  - (to be done) April DPF Newsletter

# Timeline: April 2020 – November 2020

- April 2020
  - April 15: Finalize topical groups and conveners
  - April 15: “Rough” plan of large-scale Frontier Workshops in 2020 and 2021
  - April 16: Announce topical groups, conveners, wiki page <https://snowmass21.org/>
  - April 18: Snowmass Town Hall meeting to communicate with the community
    - ZOOM 5:30-7:00pm EDT, <https://snowmass21.org/calendar/2020/04/18>

- Spring and Fall 2020
  - Various ZOOM Snowmass meetings and workshops
  - Take advantage of other workshops

<a href="#">June 22 - 27, 2020</a>	<a href="#">Neutrino 2020</a>	<a href="#">Chicago, U.S.</a>
<a href="#">July 27 - 31, 2020</a>	<a href="#">SUSY 2020</a>	<a href="#">Shanghai, China</a>
<a href="#">July 30 - August 5, 2020</a>	<a href="#">ICHEP 2020</a>	<a href="#">Prague, Czech Republic</a>
<a href="#">October 5 - 9, 2020</a>	<a href="#">HP 2020 (High Intensity &amp; High Brightness Hadron Beams)</a>	<a href="#">Fermilab, U.S.</a>
<a href="#">October 26 - 30, 2020</a>	<a href="#">Higgs 2020</a>	<a href="#">BNL, U.S.</a>
<a href="#">October 29 - Nov 1, 2020</a>	<a href="#">DNP 2020</a>	<a href="#">New Orleans, U.S.</a>

- Fall 2020
  - Snowmass Planning Meeting: November 4-6, 2020

# Energy Frontier



Meenakshi Narain (Brown U)



Laura Reina (FSU)



Alessandro Tricoli (BNL)

Topical Group		Co-Conveners			
EF01	EW Physics	Higgs Boson properties and couplings	Sally Dawson (BNL)	Andrey Korytov (U Florida)	Caterina Vernieri (SLAC)
EF02		Higgs Boson as a portal to new physics	Patrick Meade (Stony Brook)	Isobel Ojalvo (Princeton)	
EF03		Heavy flavor and top quark physics	Reinhard Schwienhorst (MSU)	Doreen Wackerroth (Buffalo)	
EF04		EW Precision Physics and constraining new physics	Alberto Belloni (Maryland)	Ayres Freitas (Pittsburgh)	Junping Tian (Tokyo)
EF05	QCD and strong interactions	Precision QCD	Michael Begel (BNL)	Stefan Hoeche (FNAL)	Michael Schmitt (Northwestern)
EF06		Hadronic structure and forward QCD	Huey-Wen Lin (MSU)	Pavel Nadolsky (SMU)	Christophe Royon (Kansas)
EF07		Heavy Ions	Yen-Jie Lee (MIT)	Swagato Mukherjee (BNL)	
EF08	BSM	Model specific explorations	Jim Hirschauer (FNAL)	Elliott Lipeles (UPenn)	Nausheen Shah (Wayne State)
EF09		More general explorations	Tulika Bose (U Wisconsin-Madison)	Zhen Liu (Maryland)	Simone Griso (LBL)
EF10		Dark Matter at colliders	Caterina Doglioni (Lund)	LianTao Wang (Chicago)	

# Neutrino Physics Frontier



Patrick Huber  
Virginia Tech



Kate Scholberg  
Duke University



Elizabeth Worcester  
BNL

Topical Group	Co-Conveners			
Neutrino Oscillations	Peter Denton	Megan Friend	Mark Messier	Hiro Tanaka
Sterile Neutrinos	Georgia Karagiorgi	Bryce Littlejohn	Pedro Machado	Alex Sousa
Beyond the SM	Pilar Coloma	Lisa Koerner	Ian Shoemaker	Jae Yu
Neutrinos from Natural Sources	Yusuke Koshio	Gabriel Orebi Gann	Erin O'Sullivan	Irene Tamborra
Neutrino Properties	Carlo Giunti	Ben Jones	Lisa Kaufman	Diana Parno
Neutrino Cross Sections	Jonathan Asaadi	Baha Balantekin	Kendall Mahn	Jason Newby
Nuclear Safeguards and Other Applications	Nathaniel Bowden	Jon Link	Wei Wang	
Theory of Neutrino Physics	André de Gouvêa	Irina Mocioiu	Saori Pastore	Louis Strigari
Artificial Neutrino Sources	Laura Fields	Alysia Marino	Pedro Ochoa	Josh Spitz
Neutrino Detectors	Josh Klein	Ana Machado	Dave Schmitz	TBD

# Rare Processes and Precision Measurements Frontier



Marina Artuso  
Syracuse U.



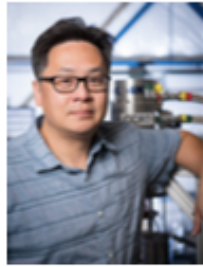
Alexey Petrov  
Wayne State U.



Bob Bernstein  
FNAL

Topical Group	Co-Conveners		
Weak Decays of b and c	Angelo di Canto	Stefan Meinel	
Strange and Light Quarks	Emilie Passemar		
Fundamental Physics and Small Experiments	Tom Blum	Peter Winter	
Baryon and Lepton Number Violation	Pavel Filievez Perez		
Charged Lepton Flavor Violation	Sacha Davidson	Bertrand Echenard	
Dark Sector at Low Energies	Stefania Gori	Mike Williams	

# Cosmic Frontier



Aaron Chou  
Fermilab



Marcelle Soares-Santos  
Brandeis University



Tim Tait  
UC Irvine

Topical Group	Co-conveners			
CF1: Particle DM	Hugh Lippincott UCSB	Jodi Cooley SMU	Tracy Slatyer MIT	Tongyan Lin UCSD
CF2: Wavelike DM	Gray Rybka UW	Lindley Winslow MIT	Joerg Jackel Heidelberg	
CF3: DM Astro Probes	Alex Drlica-Wagner Fermilab	Haibo Yu		
CF4: DE & CA The Modern Universe	Anze Slosar BNL	Masao Sako U Penn	Jeff Newman Pittsburgh	Chris Hirata OSU
CF5: DE & CA Cosmic Dawn & Before	Deirdre Shoemaker Georgia Tech	Clarence Chang ANL	Cora Dvorkin Harvard	
CF6: Dark Energy Complimentarity	Brenna Flaugher Fermilab	Elisabeth Krause Arizona	David Schlegel LBNL	
CF7: Cosmic Probes	Kirsten Tollefson MSU	Luis Anchordoqui CUNY	B.S. Sathyaprakash Penn State	Rana Adhikari Caltech

# Theory Frontier



Nathaniel Craig  
UCSB



Csaba Csaki  
Cornell



Aida El-Khadra  
UIUC

Topical Group	Co-Conveners		
String theory, quantum gravity, black holes	Daniel Harlow	Shamit Kachru	#3
Effective field theory techniques	Patrick Draper	Ira Rothstein	
CFT and formal QFT	Leonardo Rastelli	#2	
Scattering amplitudes	Zvi Bern	#2	
Lattice gauge theory	Ethan Neil	#2	
Theory techniques for precision physics	Radja Boughezal	#2	
Collider phenomenology	Fabio Maltoni	Shufang Su	Jesse Thaler
BSM model building	Hitoshi Murayama	#2	
Astro-particle physics and cosmology	Dan Green	Ben Safdi	#3
Quantum information science	Simon Catterall	Roni Harnik	Veronika Hubeny



# Accelerator Science and Technology Frontier



Steve Gourlay  
LBNL



Tor Raubenheimer  
SLAC



Vladimir Shiltsev  
FNAL

Topical Group	Co-Conveners			
<b>Accelerators for Neutrinos</b>	J. Galambos (ORNL)	B. Zwaska (FNAL)	G. Arduini (CERN)	
<b>Accelerators for EW/Higgs</b>	M. Ross (SLAC)	A. Seryi (JLAB)	Q. Qin (IHEP, Beijing)	
<b>Multi-TeV Colliders</b>	M. Palmer (BNL)	A. Valishev (FNAL)	N. Pastrone (INFN, Torino)	
<b>Accelerators for PBC and Rare Processes</b>	E. Prebys (UC Davis)	M. Lamont (CERN)	<a href="#">R. Patterson (Cornell)</a>	Back-ups A. Fryberger (JLAB), B. D. Winklehner (MIT)
<b>Advanced Accelerator Concepts</b>	C. Geddes (LBNL)	M. Hogan (SLAC)	P. Musumeci (UCLA)	R. Assmann (DESY)
<b>Accelerator Technology R&amp;D</b>				
Sub-group RF	E. Nanny (SLAC)	S. Posen (FNAL)	H. Weise (DESY)	
Sub-Group Magnets	G. Sabbi (LBNL)	S. Zlobin (FNAL)	S. Izquierdo Bermudez (CERN)	
Sub-Group Targets/Sources	C. Barbier (ORNL)	Y. Sun (ANL)		
<b>Accelerator Science, Education, Outreach*</b>	Z. Huang (Stanford)	M. Bei (GSI)	S. Lund (MSU)	

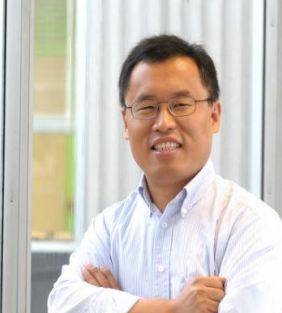
# Instrumentation Frontier



Phil Barbeau  
Duke



Petra Merkel  
Fermilab



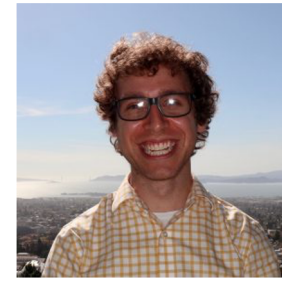
Jinlong Zhang  
Argonne

Topical Group	Co-Conveners		
Quantum Sensors	Thomas Cecil (ANL), Kent Irwin (SLAC), Reina Maruyama (Yale), Matt Pyle (Berkeley)		
Photon Detectors	Juan Estrada (FNAL)	Mayly Sanchez (ISU)	Abigail Viereggs (Chicago)
Solid State Detectors and Tracking	Tony Affolder (UCSC)	Artur Apresyan (FNAL)	Lucie Linsen (CERN)
Trigger and DAQ	Darin Acosta (Florida)	Wes Ketchum (FNAL)	Stephanie Majewski (Oregon)
Micro Pattern Gas Detectors	Thomas Schwarz (Michigan)	Maxim Titov (SACLAY)	Sven Vahsen (Hawaii)
Calorimetry	Andy White (UTA)	Minfang Yeh (BNL)	Rachel Yohay (FSU)
Electronics/ASICS	Gabriella Carini (BNL)	Mitch Newcomer (UPenn)	John Parsons (Columbia)
Noble Elements	Eric Dahl (Northwestern)	Roxanne Guenette (Harvard)	Jen Raaf (FNAL)
Cross Cutting and System Integration	Jim Fast (PNNL)	Maurice Garcia-Sciveres (LBL)	Ian Shipsey (Oxford)

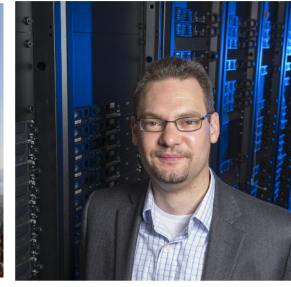
# Computational Frontier



Steven Gottlieb  
U Indiana



Ben Nachman  
LBL



Oliver Gutsche  
FNAL

Topical Group	Co-Conveners		
Experimental Algorithm Parallelization	Giuseppe Cerati (FNAL)	Katrin Heitmann (ANL)	Walter Hopkins (BNL)
Theoretical Calculations and Simulation	Peter Boyle (BNL)	Daniel Elvira (FNAL)	Ji Qiang (LBNL)
Machine Learning	Phiala Shanahan (MIT)	Kazu Terao (SLAC)	Daniel Whiteson (Irvine)
Storage and processing resource access (Facility and Infrastructure R&D)	Wahid Bhimji (NERSC)	Rob Gardner (U Chicago)	Frank Würthwein (UCSD)
End user analysis	Gavin Davies (U Mississippi)	Peter Onyisi (U Texas at Austin)	Amy Roberts (UC Denver)
Quantum computing	Travis Humble (ORNL)	Gabriel Perdue (FNAL)	Martin Savage (U Washington)
Reinterpretation and long-term preservation of data and code	Kyle Cramner (NYU)	Mike Hildreth (U Notre Dame)	TBD

# Community Involvement Frontier



Kétévi A. Assamagan  
BNL



Breese Quinn  
Mississippi

Topical Group	Co-Conveners		
Applications & Industry (A&I)	M. Demarteau M. Garcia-Sciveres	C. Thangaraj	K. Yoshimura
Career Pipeline & Development (CP&D)	Yangyang Chen	Sarah Eno Usha Mallik	Amr El Zant
Diversity & Inclusion (D&I)	MuChu Chen	S. Meehan*	Marta Losada
Physics Education (PE)	Randy Ruchti	Tim McKay F. Economou	S. de Jong
Public Education & Outreach (PE&O)	Kathryn Jepsen	B. Nord. & S. Demers	A. Muronga
Public Policy and Government Engagement (PP&GE)	Rob Fine	Louise Suter	B. Choudhary

# Underground Facilities and Infrastructure Frontier

- Group structure still under discussion

# Liaisons

	Energy Frontier (EF)	Neutrino Physics (NF)	Rare & Precision (RF)	Cosmic Frontier (CF)	Theory Frontier (TF)	Accelerator S&T (AF)	Instrumentation Frontier (IF)	Computational Frontier (CompF)	Undergrnd Facilities & Infrs (UF)	Community Frontier (CommF)
Energy Frontier (EF)		x	x	x	x (multiple?)	x	x	x (multiple?)		x
Neutrino Physics (NF)	x		x	x	x	x	x	x	x	x
Rare & Precision (RF)	x	x		x		x	x	x		x
Cosmic Frontier (CF)	x	x	x		x		x	x	x	x
Theory Frontier (TF)	x (multiple?)	x		x				x		x
Accelerator S&T (AF)	x	x	x					x		x
Instrumentation Frontier (IF)	x	x	x	x				x	x	x
Computational Frontier (CompF)	x (multiple?)	x	x	x	x	x	x			x
Undergrnd Facilities & Infrs (UF)		x		x			x			x
Community Frontier (CommF)	x	x	x	x	x	x	x	x	x	

- Energy Frontier: TBD
- Neutrino Physics: TBD
- Rare & Precision: Marina Artuso
- Cosmic Frontier: TBD
- Computational Frontier: TBD
- Underground Facilities & Infrs.: TBD
- Community Frontier: TBD

# Logistics

- Email lists: [at]fnal.gov
  - SNOWMASS-IF-CONVENERS: communication with Jinlong, Petra, Phil
  - SNOWMASS-IF-TOPICAL-GP-CONVENERS: communication with all sub-group conveners
  - SNOWMASS-INSTRUMENTATIONFRONTIER: communication with the whole group, all IF participants

We can create lists for each sub-group
- Slack channels:
  - snowmass2021/#instrumentation
  - Snowmass2021/#instrumentation-group-conveners

Do we need sub-group channels?
- Indico space:
  - <https://indico.fnal.gov/category/1106/>
- Web page:
  - <https://snowmass21.org/instrumentation/start>

Please start updating your topical group descriptions and add whatever information you would like there. You need to register to be able to edit. It's possible we have to grant access rights, let us know.
- 2013 Snowmass report:
  - <https://www.slac.stanford.edu/econf/C1307292/docs/Instrumentation.html>

# Workshops and Meetings

- Community Planning Workshop: November 4-6 2020 at Fermilab
- Letters of interest arriving between now and end of August
- Plan an Instrumentation Workshop in early summer?
- Synergy with CPAD
  - CPAD organizes interdisciplinary workshop
  - Most recent CPAD report: <https://arxiv.org/abs/1908.00194>
  - DOE Detector R&D BRN report coming out soon
- A second Instrumentation Workshop in Spring 2021?
- Joined workshops with other frontiers are being discussed
  
- Regular Instrumentation Frontier meetings monthly: this timeslot ok? New doodle poll?
- Sub-group meetings format and frequency up to you