All Frontier Conveners Meeting #3

Monday, April 6, 2020

Young-Kee Kim

DPF Chair

Timeline: January 2020 – March 2020

- January 2020
  - Announcement of frontier conveners and 2021 Snowmass site (DPF Newsletter)
  - Create a mailing list (listserv) of all frontier conveners
  - Schedule the first all frontier conveners meeting

- February – March 2020
  - All frontier conveners meetings
  - Work on topical groups and conveners
  - Site selection of the 2020 Community Planning Meeting
  - Community contribution
    - Decision on mechanisms (Letters of Interest and Contributed Papers)
    - Establishing machinery and Announcement

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 (419 members)
  - snowmass-young@fnal.gov (427 members)
  - hef-theory@slac.stanford.edu (theorists)
  - Slack
  - DPF Webpage
  - (to be done) April DPF Newsletter

Timeline: April 2020 – November 2020

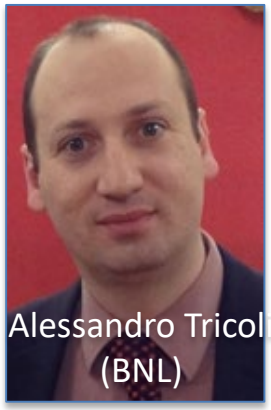
- April 2020
  - April 15: Finalize topical groups and conveners
  - April 15: "Rough" plan of large-scale Frontier Workshops in 2020 and 2021
  - April 16: Announce topical groups, conveners, wiki page https://snowmass21.org/
  - April 18: Snowmass Town Hall meeting to communicate with the community
    - 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

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

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

Energy Frontier

- Co-Conveners



- The Energy Frontier (EF) group will explore the TeV energy scale and beyond. Our sharply focused agenda includes understanding the heaviest particles of the Standard Model (SM), as well as exploring physics beyond the SM to discover new particles and interactions, including unraveling the mystery of dark matter. In this context, the EF group will carry out (and compile) detailed studies of **Electroweak (EW) physics, QCD and strong interactions, and Beyond-Standard-Model (BSM) physics** under different future accelerator scenarios, including lepton-lepton, hadron-hadron, and lepton-hadron colliders.

Energy Frontier

- Topical Groups and Co-Conveners (all confirmed)

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 Wackeroth (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)	

Energy Frontier

- Organizational plans
  - Meetings with topical group conveners
    - bi-weekly on Mondays, 13:00-15:00 (EST)
    - starting on Monday April 13, 2020
      - Probably will add another meeting to accommodate Asian time zone.
  - Meetings with other frontiers
    - Will plan meetings mid April with Frontier conveners
    - Propose to hold joint sessions at the EF workshops with the community (see next bullet) and also the “general workshops” in Nov 2020, July 2021 etc).
  - Workshops with the community
    - Kick-off Meeting: Thursday May 21, 2020 (full day)
    - EF Workshop: July 9-10, 2020 (two full days)

Energy Frontier

- Organizational plans
  - Initial setup of the wiki complete
  - Prior to April Town Hall meeting, plan to update the topical group wiki pages by the respective conveners
    - When can we add the names of the topical group conveners to the wiki pages?
  - Email lists for communication [all archived]
    - with EF conveners by anyone
      - SNOWMASS-EF-CONVENERS@fnal.gov
    - with topical group conveners by anyone
      - SNOWMASS-EF-TOPICAL-GP-CONVENERS@fnal.gov
    - with the EF community by EF conveners
      - SNOWMASS-ENERGY-FRONTIER-GROUP@fnal.gov
    - Considering emails for each of the 10 topical groups

Neutrino Physics Frontier

- Co-Conveners

Patrick Huber
Virginia Tech

Kate Scholberg
Duke University

Elizabeth Worcester
BNL

- Topics relevant to the physics of neutrinos
- Topical Groups and Co-Conveners: **note many overlaps in the topics**

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

+ liaisons (not selected/invited yet)

Neutrino Physics Frontier

- Organizational plans
  - Regular Zoom meetings of topical group conveners
  - ~1 mini-workshop per topical group, some potentially joint with other frontiers (or each other)
  - 1 Neutrino Frontier workshop (we think justified given size of US program)
  - Unclear yet on remote vs in person

Rare Processes and Precision Measurements Frontier

- Co-Conveners

Marina Artuso
Syracuse U.

Alexey Petrov
Wayne State U.

Bob Bernstein
FNAL

- The Frontier for Rare Processes and Precision Measurements explores fundamental physics with intense sources and ultra-sensitive detectors to seek new properties and transitions of elementary particles using searches and measurements of extremely rare processes. These experiments investigate new laws of physics that manifest themselves at higher energies or weaker interactions than those directly accessible at high-energy particle accelerators, whether in rare and suppressed decays of leptons and quarks, manifestations of the dark sector, CP violation, or other fundamental symmetries.
- Topical Groups and Co-Conveners

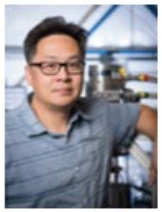
Topical Group	Co-Conveners		
Weak Decays of b and c	Angelo di Canto	Stefan Meinel	
Strange and Light Quarks	Emilie Passemar		
Fundamental Physics and Small Experiments	Tom Blum	Peter Winter	
Baryon and Lepton Number Violation	Pavel Filievez Perez		
Charged Lepton Flavor Violation	Sacha Davidson	Bertrand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

Rare Processes and Precision Measurements Frontier

- Organizational plans
  - Regular email contact and meetings as needed. Formal structure under development
  - Liaisons to each other frontier named from co-conveners and topical conveners
  - Planning a workshop in approximately March 2021 but need to understand COVID situation

Cosmic Frontier

- Co-Conveners



Aaron Chou
Fermilab

Marcelle Soares-Santos
Brandeis University

Tim Tait
UC Irvine

- Short Description

- Topical Groups and Co-Conveners:

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

Cosmic Frontier

- Organizational Plans
  - Cosmic Frontier Meetings: Zoom reports, biweekly -> weekly.
  - Looking to identify liaisons with other frontiers.
  - Workshops:
    - One cosmic frontier workshop devoted to dark matter [Date TBD].
    - One cosmic frontier workshop devoted to dark energy & cosmic acceleration [Date TBD].

Theory Frontier

- Co-Conveners

Nathaniel Craig
UCSB

Csaba Csaki
Cornell

Aida El-Khadra
UIUC

- To summarize the advances and future opportunities in all aspects particle theory, formal/string theory, cosmological and astro-particle physics and quantum information science. We are planning to focus on aspects of theory that are not directly focusing on serving an existing or already planned experimental project. We will closely coordinate with the theorists participating in the other frontiers to avoid excessive overlap.

Theory Frontier

- Topical Groups and Co-Conveners

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

- Organizational plans
  - Plan to hold community workshop at KITP in the spring of 2021, date TBA
  - Will hold initial virtual meeting with topical conveners as soon as we have them finalized
  - Will send most appropriate representatives to other frontier's meetings

Accelerator Science and Technology Frontier

- Co-Conveners

  Steve Gourlay (LBNL)

  Tor Raubenheimer (SLAC)

  Vladimir Shiltsev (FNAL)



- The Accelerator Frontier activities include discussions on high-energy hadron and lepton colliders, high-intensity beams for neutrino research and for the “Physics Beyond Colliders”, accelerator technologies, science, education and outreach as well as the progress of core accelerator technology, including RF, magnets, targets and sources. Participants will submit LoI, contributed papers, take part in corresponding workshops and events, contribute to writing summaries and take part in the general Snowmass'21 events

Accelerator Science and Technology Frontier

Topical Groups and Co-Conveners

Topical Group	Co-Conveners			
Accelerators for Neutrinos	J. Galambos (ORNL)	B. Zwaska (FNAL)	G. Arduini (CERN)	
Accelerators for EW/Higgs	M. Ross (SLAC)	A. Seryi (JLAB)	Q. Qin (IHEP, Beijing)	
Multi-TeV Colliders	M. Palmer (BNL)	A. Valishev (FNAL)	N. Pastrone (INFN, Torino)	
Accelerators for PBC and Rare Processes	E. Prebys (UC Davis)	M. Lamont (CERN)	R. Patterson (Cornell)	Back-ups A. Fryberger (JLAB), B. D. Winklehner (MIT)
Advanced Accelerator Concepts	C. Geddes (LBNL)	M. Hogan (SLAC)	P. Musumeci (UCLA)	R. Assmann (DESY)
Accelerator Technology R&D				
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)		
Accelerator Science, Education, Outreach*	Z. Huang (Stanford)	M. Bei (GSI)	S. Lund (MSU)	

*Includes Engineering and Technology (Floating the idea of adding Stewardship, e.g. EIC)

Accelerator Science and Technology Frontier

- Organizational plans and current status
  - First meeting with topical group conveners (TGC's) is April 8th
  - Will engage TGC's to formulate structure and scheduling of future meetings
  - Take advantage of scheduled workshops where overlaps exist
    - GARD ABP Workshop has overlap with Acc. Sci, Edu and Outreach
      - Will engage Workshop Organizing Committee and TGC
      - 4 segments (one per week) starting in April using Zoom
    - HB2020 October 5-9, 2020 at Fermilab
  - Liaisons
    - Energy Frontier, Neutrinos, Rare Processes, Computation and Theory (Lian Tao Wang, U. Chi)
      - Others??
  - Still working on . . .
    - Meetings with other frontiers
    - Community Workshops

Instrumentation Frontier

- Co-Conveners
  - Phil Barbeau (Duke)
  - Petra Merkel (FNAL)
  - Jinlong Zhang (ANL)



- The Instrumentation Frontier group is geared to discussing detector technologies and R&D needed for future experiments in collider physics, neutrino physics, intensity physics and at the cosmic frontier. It is divided into more or less diagonal sub-groups with some overlap among a few of them. The sub-groups are Calorimetry, Cross Cutting and Systems Integration, Electronics/ASICs, Micro Pattern Gas Detectors, Noble Elements, Photon Detectors, Quantum Sensors, Solid State Detectors and Tracking, and Trigger and DAQ. Synergies between the different sub-groups, as well as with other Frontier groups and research areas outside of HEP will be paid close attention to.

Instrumentation Frontier

- Topical Groups and Co-Conveners

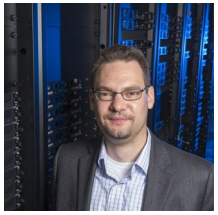
Topical Group	Co-Conveners		
Quantum Sensors	Thomas Cecil (ANL), Kent Irwin (SLAC), Reina Maruyama (Yale), Matt Pyle (Berkeley)		
Photon Detectors	Juan Estrada (FNAL)	Mayly Sanchez (ISU)	Abigail Vieregg (Chicago)
Solid State Detectors and Tracking	Tony Affolder (UCSC)	Artur Apresyan (FNAL)	Lucie Linssen (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)

- Organizational plans, including
  - Meetings with topical group conveners within your frontier
    - Doodle poll for the regular meeting
  - Meetings with other frontiers
    - To arrange discussions on the liaisons
  - Workshops with the community
    - To be discussed at the first topical group convener meeting
  - ….

Computational Frontier

Steven Gottlieb
U Indiana

Ben Nachman
LBL



Oliver Gutsche
FNAL

- Software and Computing are an integral part of the science process.
  - High Energy Physics traditionally had the largest computing resource needs and subsequently most complex software stack in science. This is not true anymore, with many other science domains predicting equal or larger resource needs.
  - We want to gain an overall understanding of the community's needs and discuss common solutions to them in the context of current and future solutions from the HEP community, other science disciplines and industry solutions.
- Topical Groups and Co-Conveners

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

Computational Frontier

- Coordination with other frontiers
  - Software & computing is important for almost all other frontiers, so close coordination is needed
  - Have asked other frontiers to dedicate a liaison to the computational frontier
- Topical Working groups conveners
  - Plan to meet monthly
  - Maybe include liaisons for coordination or have separate meetings with the liaisons
- Workshops - two prong strategy
  - Considering dedicated workshop for software & computing
  - Asking other frontiers to attach software & computing sessions to their workshops
- Whitepapers and surveys
  - Will follow the Snowmass 2021 white paper process, and will ask working group conveners to ask for specific white papers from groups/individuals to write their reports
  - Planning to design a survey with questions from the working groups to experiments/larger science collaborations to gather initial input for Snowmass 2021 process

Community Involvement Frontier

- Co-Conveners

Kétévi A. Assamagan (BNL)

Breese Quinn (Mississippi)

- The objective is to improve and sustain strategic engagements with our communities in order to draw support for and strengthen the field of particle physics, while playing key roles in serving those communities. These engagements take well-coordinated efforts in many areas where the communities of experts and non-experts can understand and communicate our field's value, maximize its impact on global socioeconomic development, and open its doors to broader participation.
- Topical Groups and Co-Conveners

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

Community Involvement Frontier

- Organizational plans, including
  - Meetings with topical group conveners within your frontier
    - We will have the first meeting as soon as all the topical group conveners are identified. We will go over the charges and the plan
  - Meetings with other frontiers
    - We met with the Computation Frontier Conveners and agreed to bring “talent acquisition and retention” (i.e. training and career development) under CI “Career pipeline & development” and “Physics education”;
    - After our first meeting with topical group conveners, we will engage the other frontiers
  - Workshops with the community
    - To be discussed

Underground Facilities and Infrastructure Frontier

- Co-Conveners
- Short Description
- Topical Groups and co-Conveners
- Organizational plans

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 & Infras (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 & Infras (UF)		x		x			x			x
Community Frontier (CommF)	x	x	x	x	x	x	x	x	x	