“Snowmass’21” Accelerator Frontier

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WEPAB016

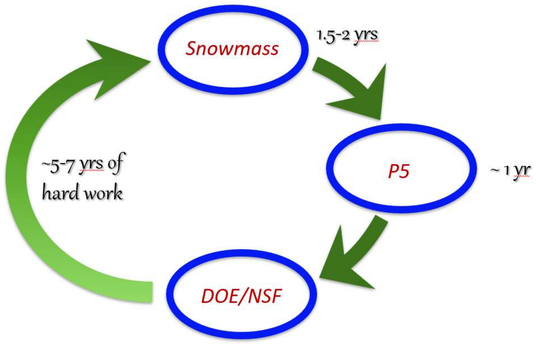
https://www.snowmass21.org/

Abstract:

“Snowmass”is the form of organization of regular, every 6 to 8 years, discussions among the entire particle physics community to develop a scientific vision for the future of particle physics in the U.S. and its international partners. The Snowmass'21 {\it 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.

What *Snowmass* is :

“Snowmass is a particle physics community study”

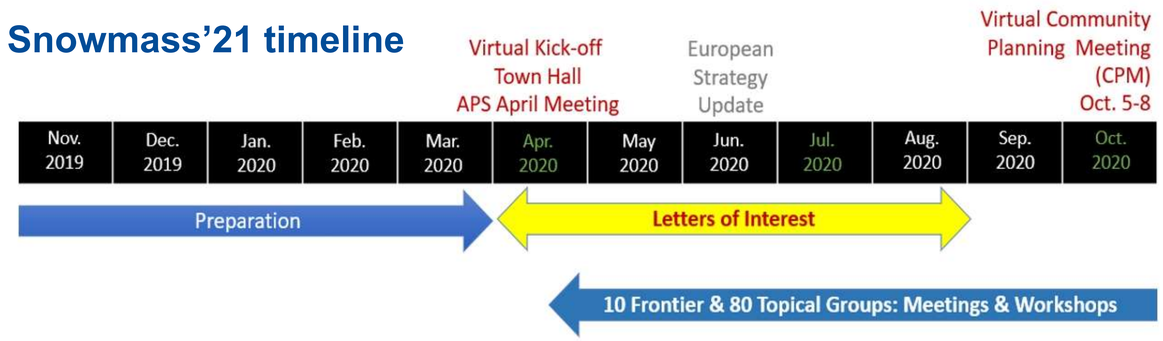


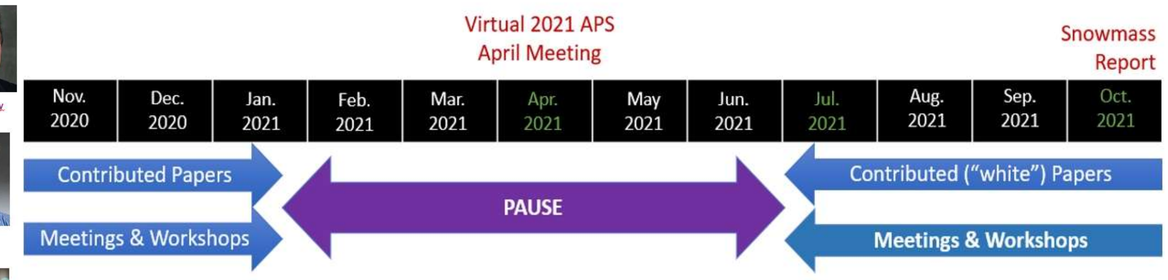
Accelerator Frontier Conveners

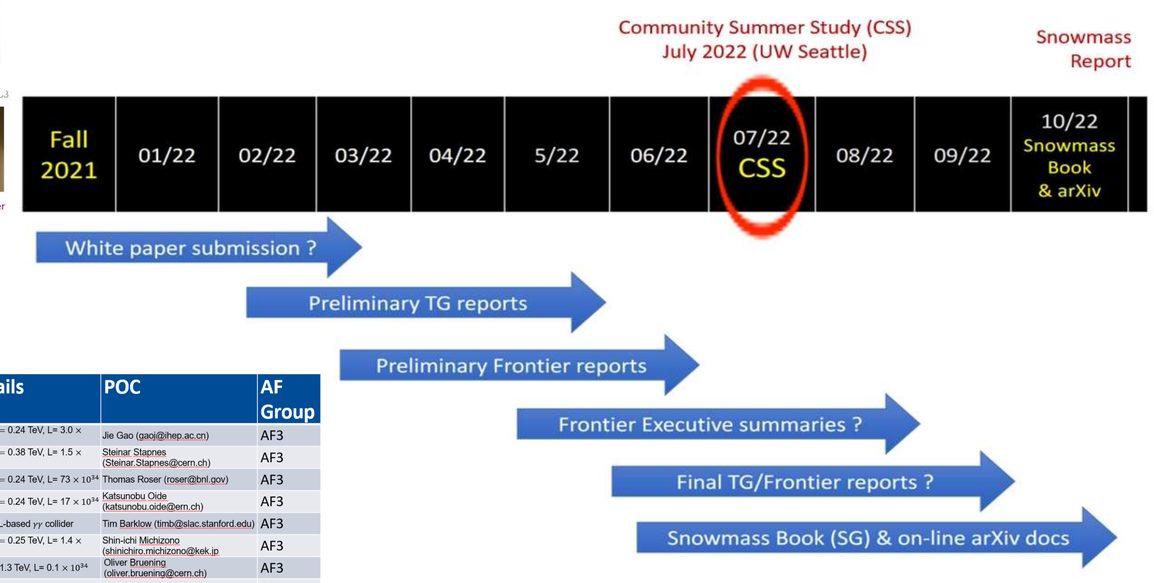
Topical Group		Topical Group co-Conveners			
AF1	Beam Phys & Accel. Education	Z. Huang (Stanford)	M. Bei (GSI)	S. Lund (MSU)	
AF2	Accelerators for Neutrinos	J. Galambos (ORNL)	B. Zwaska (FNAL)	G. Arduini (CERN)	
AF3	Accelerators for EW/Higgs	M. Ross (SLAC)	Q. Qin (IHEP, Beijing)	G.Hoffstaetter (Cornell)	
AF4	Multi-TeV Colliders	M. Palmer (BNL)	A. Valishev (FNAL)	N Pastrone (INFN, Torino)	J.Tang (IHEP, Beijing)
AF5	Accelerators for PBC and Rare Processes	E. Prebys (UC Davis)	M. Lamont (CERN)	R.Milner (MIT)	
AF6	Advanced Accelerator Concepts	C. Geddes (LBNL)	M. Hogan (SLAC)	P. Musumeci (UCLA)	R. Assmann (DESY)
AF7	Accelerator Technology R&D				
	Sub-group RF	E. Nanni (SLAC)	S. Belomestnykh (FNAL)	H. Weise (DESY)	
	Sub-Group Magnets	G. Sabbi (LBNL)	S. Zlobin (FNAL)	S. Izquierdo Bermudez (CERN)	
	Sub-Group Target/Sources	C. Barbier (ORNL)	Y. Sun (ANL)	F.Pellemoine (FNAL)	

9 out of 29 are representatives of Asia and Europe; 5 women

Snowmass’21 timeline







329 AF LoIs (incl.71 joint - EF, NF, RPF, …)

- AF1: Beam Physics and Accelerator Education **61 (14)**
- AF2: Accelerators for Neutrinos **18 (5)**
- AF3: Accelerators for EW/Higgs **32 (4)**
- AF4: Multi-TeV Colliders **56 (10)**
- AF5: Accelerators for PBC and Rare Proc. **37 (22)**
- AF6: Advanced Accelerator Concepts **71 (5)**
- AF7: Accelerator Technology R&D **137 (6)**

AF Implementation Task Force

- Key question for Snowmass’21 Accelerator Frontier to address: *“…What are the time and cost scales of the R&D and associated test facilities as well as the time and cost scale of the facility?”*
- A large number of possible accelerator projects: ILC, Muon Collider, gamma-gamma and ERL options, a large circumference electron ring, and a large circumference hadron ring amongst others.
- Comparison of the expected costs (using different accounting rules), schedule, and R&D status for the projects.
- The *Accelerator Implementation Task Force* comprises of 10 world-renowned accelerator experts from Asia, Europe and US and two reps. of the *Snowmass Young*; it is chaired by Thomas Roser (BNL) and charged with developing metrics and processes to facilitate a comparison between projects (see next slide).

Muon Collider Forum Kickoff meeting

Wednesday Jan 27, 2021, 10:30 AM → 12:30 PM US/Central

https://indico.fnal.gov/event/47038/

Description Topic: Muon Collider Forum Kickoff

Time: Jan 27, 2021 10:30 AM Central Time (US and Canada)

- 10:00 AM → 10:10 AM **Introduction**
- 10:10 AM → 10:30 AM **Muon Collider summary from TF** — Speakers: Fabio Maltoni (Université catholique de Louvain), Patrick Meade (Stony Brook University)
- 10:30 AM → 10:50 AM **Muon Collider summary from AF** — Speakers: Derun Li (LBNL), Diktys Stratakis (Fermi National Accelerator Laboratory)
- 10:50 AM → 11:10 AM **Muon Collider summary from EF** — Speakers: Kevin Black, Sergo Jindariani (FNAL)
- 11:10 AM → 12:10 PM **Discussion**

ITF :18 (!) high energy collider concepts/proposals

Name	Details	POC	AF Group
Cryo-Cooled Copper linac	e+e-, $\sqrt{s} = 2$ TeV, L= 4.5×10^{34}	Emilio Nanni (nanni@slac.Stanford.edu)	AF3
High Energy CLIC	e+e-, $\sqrt{s} = 1.5 - 3$ TeV, L= 5.9×10^{34}	S.Stapnes (steinar.stapnes@cern.ch)	AF4
High Energy ILC	e+e-, $\sqrt{s} = 1 - 3$ TeV	Hassan Padamsee (hsp3@cornell.edu)	AF4
FCC-hh	pp, $\sqrt{s} = 100$ TeV, L= 30×10^{34}	M.Benedikt (Michael.Benedikt@cern.ch)	AF4
SPPC	pp, $\sqrt{s} = 75/150$ TeV, L= 10×10^{34}	J.Tang (tangjy@ihep.ac.cn)	AF4
Collider-in-Sea	pp, $\sqrt{s} = 500$ TeV, L= 50×10^{34}	P.McIntyre mcintyre@physics.tamu.edu	AF4
LHeC	ep, $\sqrt{s} = 1.3$ TeV, L= 1×10^{34}	Y.Zhang (yzhang@jlab.org)	AF4
FCC-eh	ep, $\sqrt{s} = 3.5$ TeV, L= 1×10^{34}	Y.Zhang (yzhang@jlab.org)	AF4
CEPC-SPPpC-eh	ep, $\sqrt{s} = 6$ TeV, L= 4.5×10^{33}	Y.Zhang (yzhang@jlab.org)	AF4
VHE-ep	ep, $\sqrt{s} = 9$ TeV	Y.Zhang (yzhang@jlab.org)	AF4
MC – Proton Driver 1	$\mu\mu$, $\sqrt{s} = 1.5$ TeV, L= 1×10^{34}	D.Schulte (daniel.schulte@cern.ch)	AF4
MC – Proton Driver 2	$\mu\mu$, $\sqrt{s} = 3$ TeV, L= 2×10^{34}	D.Schulte (daniel.schulte@cern.ch)	AF4
MC – Proton Driver 3	$\mu\mu$, $\sqrt{s} = 10 - 14$ TeV, L= 20×10^{34}	D.Schulte (daniel.schulte@cern.ch)	AF4
MC – Positron Driver	$\mu\mu$, $\sqrt{s} = 10 - 14$ TeV, L= 20×10^{34}	D.Schulte (daniel.schulte@cern.ch)	AF4
LWFA-LC (e+e- and $\gamma\gamma$)	Laser driven; e+e-, $\sqrt{s} = 1 - 30$ TeV	Carl Schroeder (CBSchroeder@lbl.gov)	AF6
PWFA-LC (e+e- and $\gamma\gamma$)	Beam driven; e+e-, $\sqrt{s} = 1 - 30$ TeV	Gessner, Spencer J. (sgess@slac.edu)	AF6
SWFA-LC	Structure wakefields; e+e-, $\sqrt{s} = 1 - 30$ TeV	Chunguang Jing (jingchg@anl.gov)	AF6

Name	Details	POC	AF Group
CepC	e+e-, $\sqrt{s} = 0.24$ TeV, L= 3.0×10^{34}	Jie Gao (gaoj@ihep.ac.cn)	AF3
CLIC (Higgs factory)	e+e-, $\sqrt{s} = 0.38$ TeV, L= 1.5×10^{34}	Steinar Stapnes (Steinar.Stapnes@cern.ch)	AF3
ERL ee collider	e+e-, $\sqrt{s} = 0.24$ TeV, L= 73×10^{34}	Thomas Roser (roser@bnl.gov)	AF3
FCC-ee	e+e-, $\sqrt{s} = 0.24$ TeV, L= 17×10^{34}	Katsunobu Oide (katsunobu.oide@ern.ch)	AF3
gamma gamma	X-ray FEL-based $\gamma\gamma$ collider	Tim Barklow (timb@slac.stanford.edu)	AF3
ILC (Higgs factory)	e+e-, $\sqrt{s} = 0.25$ TeV, L= 1.4×10^{34}	Shin-ichi Michizono (shinichiro.michizono@kek.jp	AF3
LHeC	ep, $\sqrt{s} = 1.3$ TeV, L= 0.1×10^{34}	Oliver Bruening (oliver.bruening@cern.ch)	AF3
MC (Higgs factory)	$\mu\mu$, $\sqrt{s} = 0.13$ TeV, L= 0.01×10^{34}	Mark Palmer (mpalmer@bnl.gov)	AF3