

Conduct @ Snowmass Community Summer Study

By participating in this workshop, you are consenting to abide by the [DPF Core Principles & Community Guidelines](#) (see <https://snowmass21.org/cpcg/start>).

Respect and support community members.

- Use privileged status to empower & amplify voices that are being excluded.

Communicate with *empathy*.

- Try to understand others' ideas and perspectives before addressing them.

Commit to *constructive dialogue*.

- Criticize ideas, not people. Provide reasoned arguments that improve conversation.

Take *initiative*.

- Intervene when you see behavior that violates community standards.

Violations of community guidelines can be reported to the Ethics Advisory Committee's Code-of-Conduct Response Team via email (snowmass-code@u.washington.edu) or Slack ([#code-of-conduct](#)) message, over Zoom, or in person.

- The CRT will treat all reporters respectfully and all complaints seriously.
- » Behavior requiring an **immediate response** should also be reported to the session chair, Slack moderator, or similar authority.

You are encouraged to invoke the CP&CG as needed to promote and maintain a welcoming, professional, and safe environment for all workshop participants!

Energy Frontier: BSM II session intro

EF08: Jim Hirschauer (FNAL), Elliot Lipeles (UPenn), Nausheen Shah (Wayne State)

EF09: Tulika Bose (U Wisconsin-Madison), Simone Griso (LBL), Zhen Liu (Minnesota)

EF10: Caterina Doglioni (Lund), LianTao Wang (Chicago), Antonio Boveia (Ohio State)



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Intro and layout of the BSM report

- Introduction has a brief summary of BSM motivations...
 - **Direct observations:** DM, Matter-Antimatter Asymmetry, Anomalies, Existence of gravity, Cosmological tensions
 - **Theoretical Motivations:** Naturalness, Flavor structure of SM, Lightness of neutrinos, Strong CP violation, Desire for grand unified theory
 - **Exploring the unknown:** Maintaining a wide open view
- Above motivations most relevant to Energy Frontier are then expanded in two sections:
 - II. Experimental guidance & motivation
 - A. Dark Matter
 - B. Anomalies in Indirect Measurements ($g-2$, m_W , etc)
 - C. General Exploration
 - III. Theoretical guidance & motivation
 - A. Naturalness
 - B. Higgs and Electroweak Symmetry Breaking
 - C. Composite Higgs and Extra Dimensions
 - D. Supersymmetry (SUSY)

Intro and layout of the BSM report (con't)

- This is followed by a brief discussion of methods and collider scenarios
- And then sections discussing search targets / signatures and projections

V. Composite Higgs and Extra Dimensions

- A. Kaluza-Klein Excitations
- B. Composite Higgs

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VI. Supersymmetry (SUSY)

- A. pMSSM Scans

VII. Leptoquarks

VIII. New Bosons and Heavy Resonances

- A. Z' Bosons: the Standard Candle of BSM Physics
- B. W' Bosons
- C. Axion-Like Particles
- D. Dijet Resonances

IX. New Fermions

- A. Neutral Leptons
- B. Charged Leptons
- C. Heavy Quarks
- D. Exotic Signals

X. Long Lived Particles

- A. Strategies and detector R&D
- B. Dedicated detectors for LLPs
- C. Signatures & models

XI. Dark Matter

- A. Testing the simplest/minimal WIMP models (EW multiplets) and their extensions
- B. Testing DM with the Higgs boson
- C. Dark Matter: Simplified models
- D. Beyond WIMPs: Dark Matter portals and other models

XII. Other signatures

- A. Charged-lepton flavor violation
- B. Anomaly detection

EF BSM Report

BSM Report available at: [Report v2](#)

Comments and suggestions very welcome! [Google doc](#)

Goals for today:

- Discussion of the main messages pertaining to “More general explorations” or EF09
 - Sessions on [Monday](#) and [Thursday](#) focused on Higgs as a portal to new physics (EF02), Model specific explorations (EF08) and Dark Matter (EF10)
- Panel discussion related to the overall message of the EF BSM report

More general explorations (EF09)

Sections

- New Bosons and Heavy Resonances
- New Fermions
- Long-Lived Particles
- Other signatures (anomaly detection, extreme dark-sector motivated signatures, charged lepton flavor violation ... not discussed in this presentation)

Main Goal:

- Provide standard-candle assessment of potential for high-energy exploration
- Emphasize and maximize flexibility of colliders in exploring unexpected signatures now and in the future

Schedule

8:00 AM	Introduction ⓘ Speakers: Simone Pagan Griso (Lawrence Berkeley National Laboratory), Tulika Bose (University of Wisconsin-Madison), Zhen Liu (University of Minnesota)	🕒 10m ⓘ
8:10 AM	New Bosons and Heavy Resonances 10' after the talk is reserved for Q&A Speaker: Robert Harris (Fermilab)	🕒 15m ⓘ
8:35 AM	New Fermions 10' after the talk is reserved for Q&A Speaker: Julie Hogan (Bethel University)	🕒 15m ⓘ
9:00 AM	LLPs: overview of main results in the report Speaker: Juliette Alimena (CERN)	🕒 10m ⓘ
9:10 AM	LLPs: interplay with instrumentation frontier Speaker: Artur Apresyan (Fermilab)	🕒 15m ⓘ
9:25 AM	LLPs: common discussion	🕒 10m ⓘ
9:35 AM	Panel: strengthen the main messages of the EF BSM report -- feedback from community Speakers: Dean Robinson (LBL), Stephane Willlocq (University of Massachusetts), Suchita Kulkarni, Tova Holmes (University of Tennessee)	🕒 25m ⓘ

Relevant Sessions

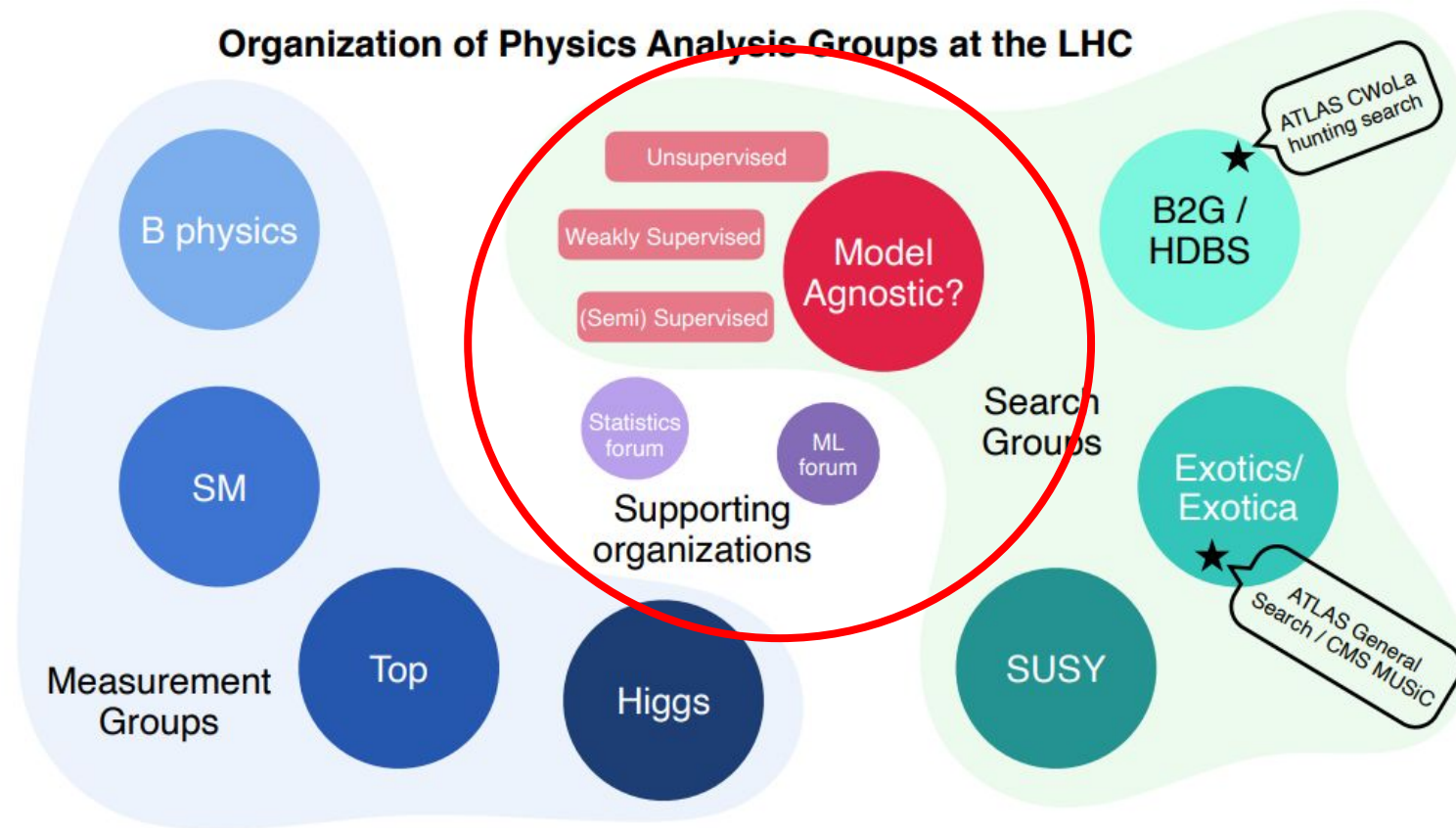
Thur, 7-21	EF DM Discussion	10am-12pm	110 Kane
Fri, 7-22	EF BSM IV	8am-9am	102 JHN
Fri, 7-22	EF BSM V	9am-10am	022 JHN
Sat, 7-23	EF Discussion and Summaries (ie EF plenary)	8am-noon	130 Kane

Day	EF Plenary Session	Time	Room
Tue, 7-19	Lepton Colliders	3:30pm-5:00pm	120 Kane
Sat, 7-23	Physics on the Energy Frontier	2pm-3:30pm	130 Kane
Mon, 7-25	Panel: Physics Highlights from the Frontiers	8:00-9:30am	130 Kane
Tue, 7-26	Panel: Large Exp./Facilities & timelines	9:00-10:00am	130 Kane
Tue, 7-26	Panel: Mid/Small Exp./Facilities & timelines	10:30-11:30am	130 Kane

(selected) Relevant Sessions

Energy Frontier and Related Sessions				Room loca
	Date	Session Name	Time Slot in PS	Room (ma
Monday	7-18	EF Higgs and BSM I	8am-noon	332 HUB
	7-18	XF: Report of the Accelerator Frontier Impleme	3:35pm-5pm	
Tuesday	7-19	XF DM Complementarity	8am-noon	220 Kane
	7-19	XF Energy Frontier Theory	8am-noon	175 JHN
	7-19	EF Plenary - Lepton Colliders	3:35pm-4:58pm	120 Kane
Wednesday	7-20	EF BSM II - non DM	8am-10 am	220 Kane
	7-20	XF Long Lived Particles	10am-noon	340 HUB
Thursday	7-21	EF DM Discussion	10am-12pm	110 Kane
	7-21	XF Flavor anomalies and exotics at colliders	8am-10am	241 Kane
	7-21	XF CLFV and heavy states	10am-12pm	231 MGH
	7-21	XF Flavor anomalies & exotics (RF-EF-TF)	10am-12pm	241 MGH
Friday	7-22	EF BSM IV	8am-9am	102 JHN
	7-22	EF BSM V	9am-10am	022 JHN
	7-22	NF-EF Cross-cutting issues	8am-10am	
	7-22	combined EF/AF report discussion	10am-12pm	022 JHN
Saturday	7-23	EF Discussion and Summaries (ie EF plenary)	8am-noon	130 Kane
	7-23	EF Plenary talks - Physics on the Energy Fronti	2pm-3:30pm	130 Kane
Sunday	7-24	XF: AF Future Colliders R&D Program Initiative	10am-noon	120 Kane
Monday	7-25	Panel: Physics Highlights from the Frontiers	8:00-9:30am	130 Kane
Tuesday	7-26	Panel: Large Exp./Facilities & timelines	9:00-10:00am	130 Kane
Tuesday	7-26	Panel: Mid/Small Exp./Facilities & timelines	10:30-11:30am	130 Kane

Broad BSM search (model agnostic searches) complementary and important



Cross
frontier
topics with
computatio
n frontier.

Questions to our panelists

- What is the main takeaway message from the BSM report that should be conveyed in the overall Energy Frontier executive summary ?
- What important physics point do you see missing in the EF BSM report or not emphasized enough ?
- How important do you consider model independent (model agnostic, anomaly detection etc.) searches to be ?