

Welcome to the SBN SPINE Workshop at Columbia University's Nevis Labs!



Welcome to Nevis Labs!



Nevis Science Center



We are here!
(Science Center)

Brief History of the Nevis Science Facility

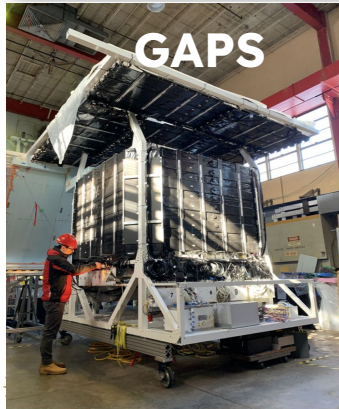
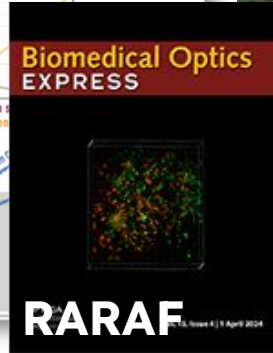
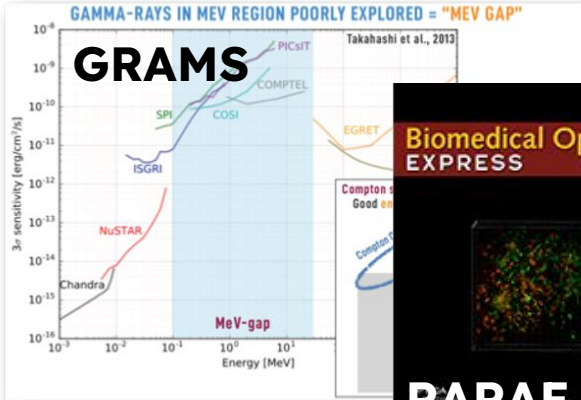
- The facility uses the 74 acre site from the 1836 estate of James Hamilton (son of Alexander Hamilton) that was donated to Columbia University in the 1930's
 - Named after the island of Nevis, Alexander Hamilton's birthplace
 - Over 200 types of trees on the property
- The current Nevis science facility is a legacy from the 400 MeV Nevis cyclotron project initiated in 1947 and retired in 1978.
- After the cyclotron era, the role of Nevis Labs transitioned to an R&D, construction, and physics analysis center.



Dedication of the Nevis Cyclotron, May 2, 1950. Left to right: Columbia's President Dwight D. Eisenhower, Prof. I. I. Rabi, Visiting Prof. Hideki Yukawa, and Prof. John R. Dunning.

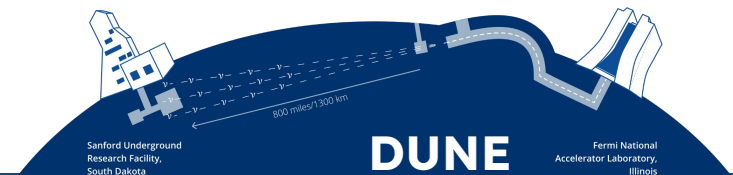
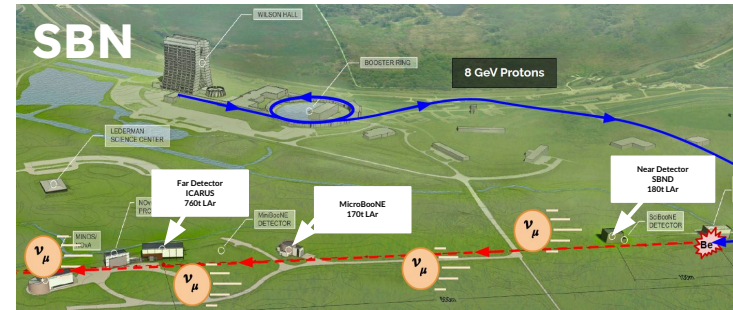
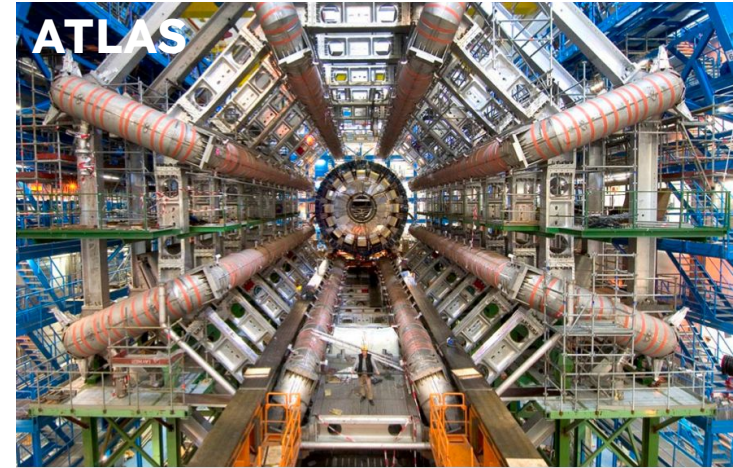
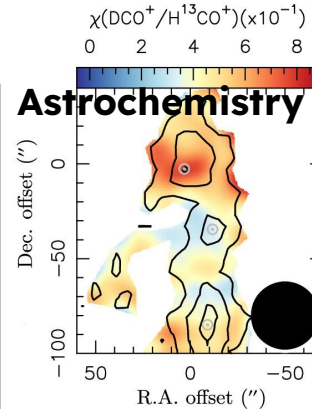
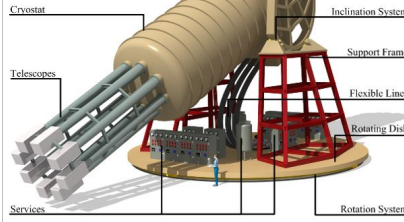
Nevis Labs Today

Provides support for experiments in particle physics, nuclear physics, astrophysics, and medical physics.

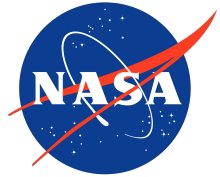


8 X-ray optics focus signal onto low-background detectors

IAXO



Current Research Programs at Nevis Labs



- **Experimental Particle Physics**
 - Collider physics: ATLAS
 - Neutrino physics: MicroBooNE, SBN/D and DUNE, CCM
 - 6 faculty, 5 postdocs, ~10 students, 7 technical and admin. staff
- **Particle-/Astrophysics:**
 - Astro-particle physics: GAPS, IAXO, GRAMS, VERITAS, CTAO
 - Astrochemistry and Planetary Science
- **RARAF**
 - Radiological studies of living cells using Nevis 5.5 MeV “Singletron” accelerator



SBN SPINE Workshop

September 29, 2025 to October 3, 2025
Columbia University, Nevis Laboratories
America/New_York timezone



Overview

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SBN SPINE Workshop

One-week workshop dedicated to improving the general understanding of machine learning tools and their implementation in the context of LArTPC detectors, and in particular the [SPINE](#) package.

The workshop will consist of a general lecture-style introduction on Monday, and then be roughly evenly split between tutorial and working sessions. Tutorials will consist of interactive notebooks with simple tasks to complete on the fly. The working sessions will consist of addressing specific projects defined on Monday or pursue specific physics targets.

The notebooks and resources are stored [here](#).

Zoom link for remote participation: <emailed to all registered participants>

Workshop Slack channel [#spine-workshop-2025](#).

SPINE help channel (SBN and DUNE workspaces): [#lartpc-mlreco3d](#)

Organizing Committee:

Francois Drielsma, SLAC

Georgios Karagiannis, Columbia

Agenda at a glance

09:00	Breakfast	<i>Breakfast</i>
	Nevis Science Center, Columbia University, Nevis Laboratories	09:00 - 09:30
	Introductory Remarks	Francois Drielsma
	Nevis Science Center, Columbia University, Nevis Laboratories	09:30 - 09:40
	Logistics	Georgia Karagiorgi
	Nevis Science Center, Columbia University, Nevis Laboratories	09:40 - 09:50
	Introduction to Machine Learning Tools	Kazuhiro Terao
10:00		
11:00	Intro Talks	
	Nevis Science Center, Columbia University, Nevis Laboratories	09:50 - 11:10
	Introduction to SPINE	Francois Drielsma
12:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	11:10 - 12:30
13:00	Lunch	
	Nevis Science Center, Columbia University, Nevis Laboratories	12:30 - 13:30
	Computing	Kazuhiro Terao
	Nevis Science Center, Columbia University, Nevis Laboratories	13:30 - 14:00
14:00	LARCV Visualization	Francois Drielsma
	Nevis Science Center, Columbia University, Nevis Laboratories	14:00 - 14:30
	Projects	Francois Drielsma
	Nevis Science Center, Columbia University, Nevis Laboratories	14:30 - 15:00
15:00	Coffee	
	Nevis Science Center, Columbia University, Nevis Laboratories	15:00 - 15:30
16:00	Working Time	
	Nevis Science Center, Columbia University, Nevis Laboratories	15:30 - 17:00

Monday

09:00	Breakfast	<i>Breakfast</i>
	Nevis Science Center, Columbia University, Nevis Laboratories	
	Supera	
10:00	Nevis Science Center, Columbia University, Nevis Laboratories	
	Training and Validation	Tutorials
	Nevis Science Center, Columbia University, Nevis Laboratories	
11:00	Inference	
	Nevis Science Center, Columbia University, Nevis Laboratories	
	Analysis Template	
12:00	Nevis Science Center, Columbia University, Nevis Laboratories	
	Lunch	
13:00	Nevis Science Center, Columbia University, Nevis Laboratories	
	Working Time	
14:00		Working Time
	Nevis Science Center, Columbia University, Nevis Laboratories	
15:00	Coffee	
	Nevis Science Center, Columbia University, Nevis Laboratories	
	Working Time	
16:00		Working Time
	Nevis Science Center, Columbia University, Nevis Laboratories	
	Flash reports	Flash Reports
	Nevis Science Center, Columbia University, Nevis Laboratories	
17:00		

Tuesday

09:00	Breakfast	<i>Breakfast</i>
	Nevis Science Center, Columbia University, Nevis Laboratories	09:00 - 09:30
	Medulla	Justin Mueller
10:00		
	Talks/ Discussions	
	Nevis Science Center, Columbia University, Nevis Laboratories	09:30 - 11:00
11:00	Calibrations	Michael Mooney
	Nevis Science Center, Columbia University, Nevis Laboratories	11:00 - 11:45
	Michel Reconstruction	Junjie Xia
12:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	11:45 - 12:30
	Lunch	
13:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	12:30 - 13:30
	Working Time	
14:00		Working Time
	Nevis Science Center, Columbia University, Nevis Laboratories	13:30 - 15:00
15:00	Coffee	
	Nevis Science Center, Columbia University, Nevis Laboratories	15:00 - 15:30
	Working Time	
16:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	15:30 - 16:30
	Flash Reports	Flash Reports
	Nevis Science Center, Columbia University, Nevis Laboratories	16:30 - 17:00
17:00		

Wednesday

Agenda at a glance

09:00	Breakfast	<i>Breakfast</i>
	Nevis Science Center, Columbia University, Nevis Laboratories	09:00 - 09:30
	P0 Reconstruction	Lane Kashur
10:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	09:30 - 10:30
	Electron neutrinos	Daniel Carber
11:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	10:30 - 11:30
	SBN Joint Physics	Dante Totani
12:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	11:30 - 12:30
	Lunch	
13:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	12:30 - 13:30
	Working Time	
14:00		
	Working Time	
	Nevis Science Center, Columbia University, Nevis Laboratories	13:30 - 15:00
15:00		
	Coffee	
	Nevis Science Center, Columbia University, Nevis Laboratories	15:00 - 15:30
	Working Time	
16:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	15:30 - 16:30
	Flash Reports	
	Nevis Science Center, Columbia University, Nevis Laboratories	16:30 - 17:00

Thursday *Flash Reports*

09:00	Breakfast	<i>Breakfast</i>
	Nevis Science Center, Columbia University, Nevis Laboratories	09:00 - 09:30
	Working time	
10:00		
11:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	09:30 - 11:30
	Final Reports / Close-out	
12:00		
	Nevis Science Center, Columbia University, Nevis Laboratories	11:30 - 12:30

Working Time

Final Reports/ Closeout **Friday**

A huge thanks to:

Organizing Committee:

Francois Drielsma, SLAC National Accelerator Laboratory

Georgia Karagiorgi, Columbia University

Mike Mooney, Colorado State University

Kazuhiro Terao, SLAC National Accelerator Laboratory

Local Organizing Committee @ Columbia:

Seokju Chung

Georgia Karagiorgi

Nupur Oza

Brandon Weiss

Administrative and Technical Support @ Nevis:

Amy Garwood

Asia Latt

Bill Seligman

And now... logistics!

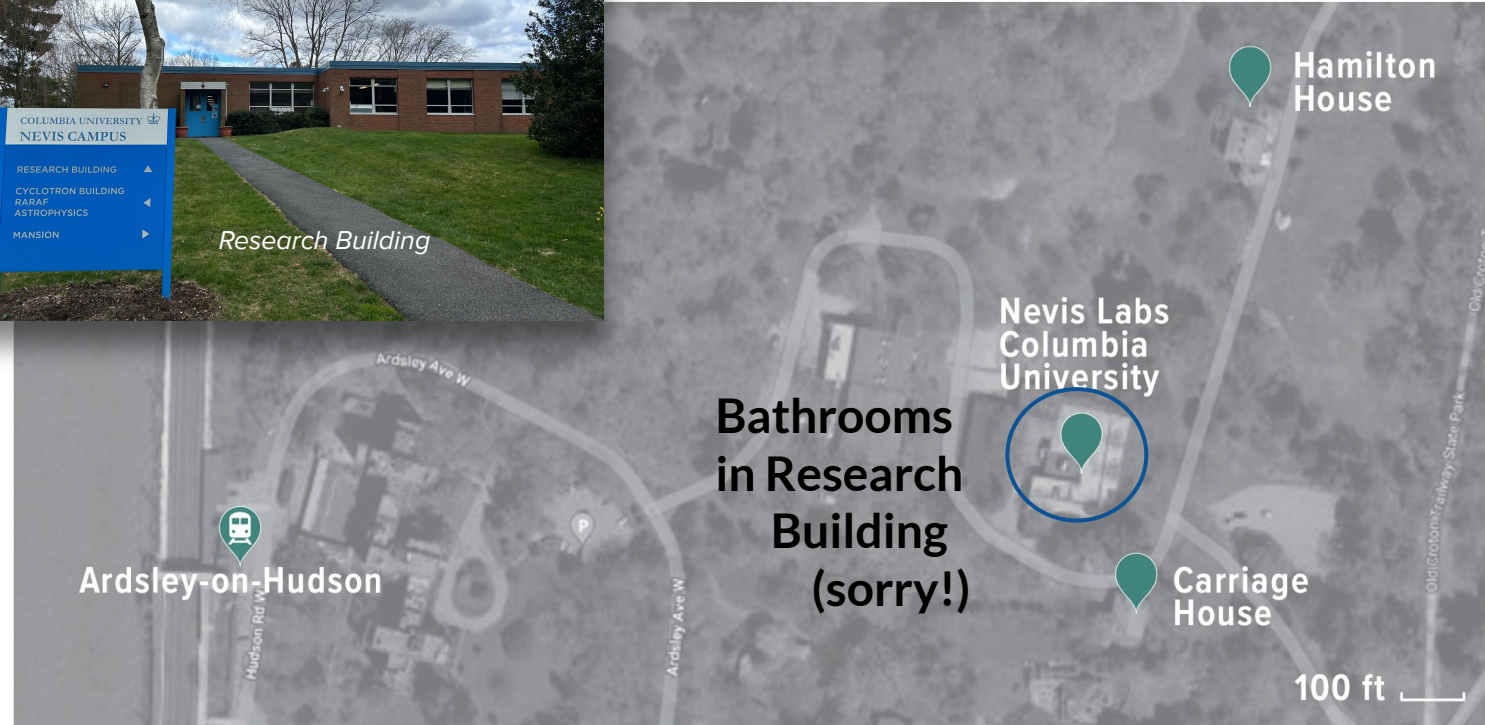
And now... logistics!

Talks, tutorials, discussion, reports, working time
will be here in this room.

Breakfast, coffee breaks
will also be here (or feel free to wander
on the grounds outside—
weather permitting)



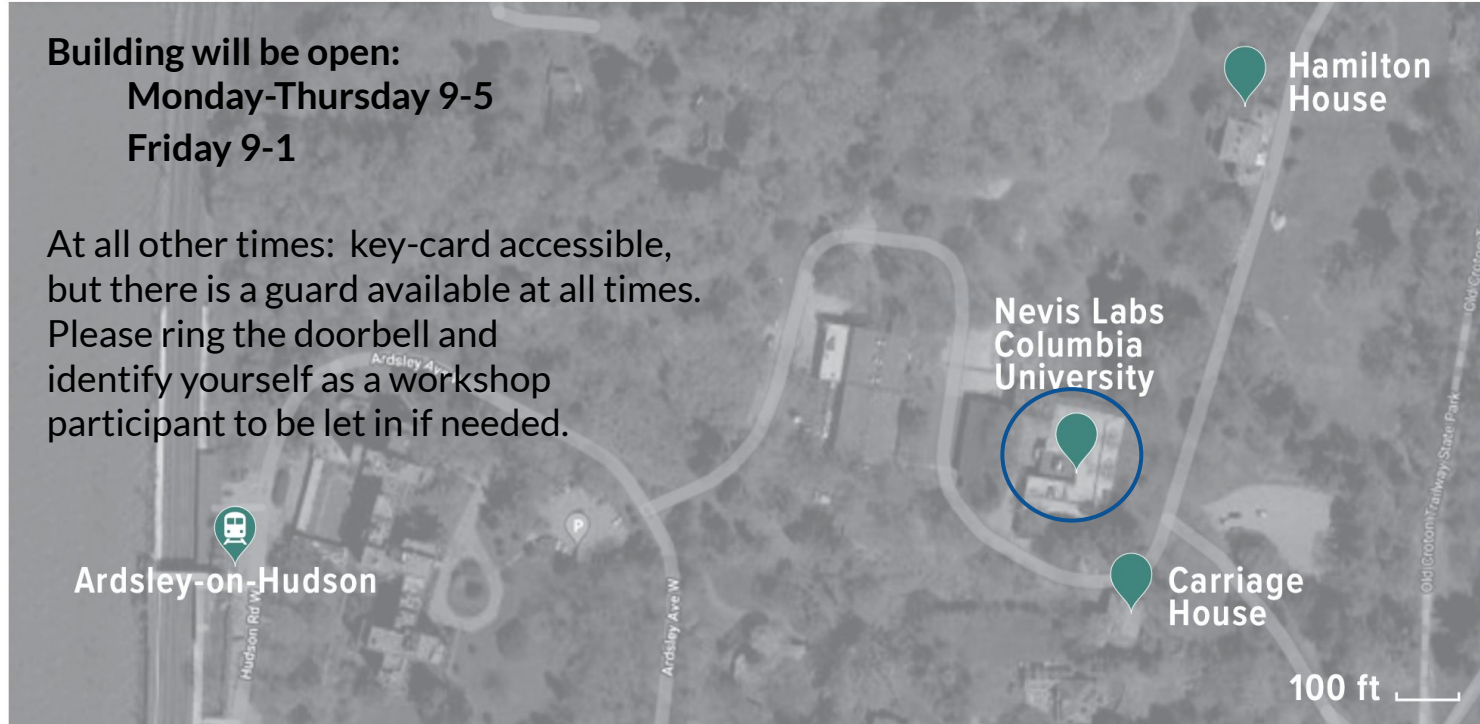
And now... logistics!



And now... logistics!

Building will be open:
Monday-Thursday 9-5
Friday 9-1

At all other times: key-card accessible,
but there is a guard available at all times.
Please ring the doorbell and
identify yourself as a workshop
participant to be let in if needed.



And now... logistics!

Breakout Sessions:

Two rooms have been reserved, in the Research Building:

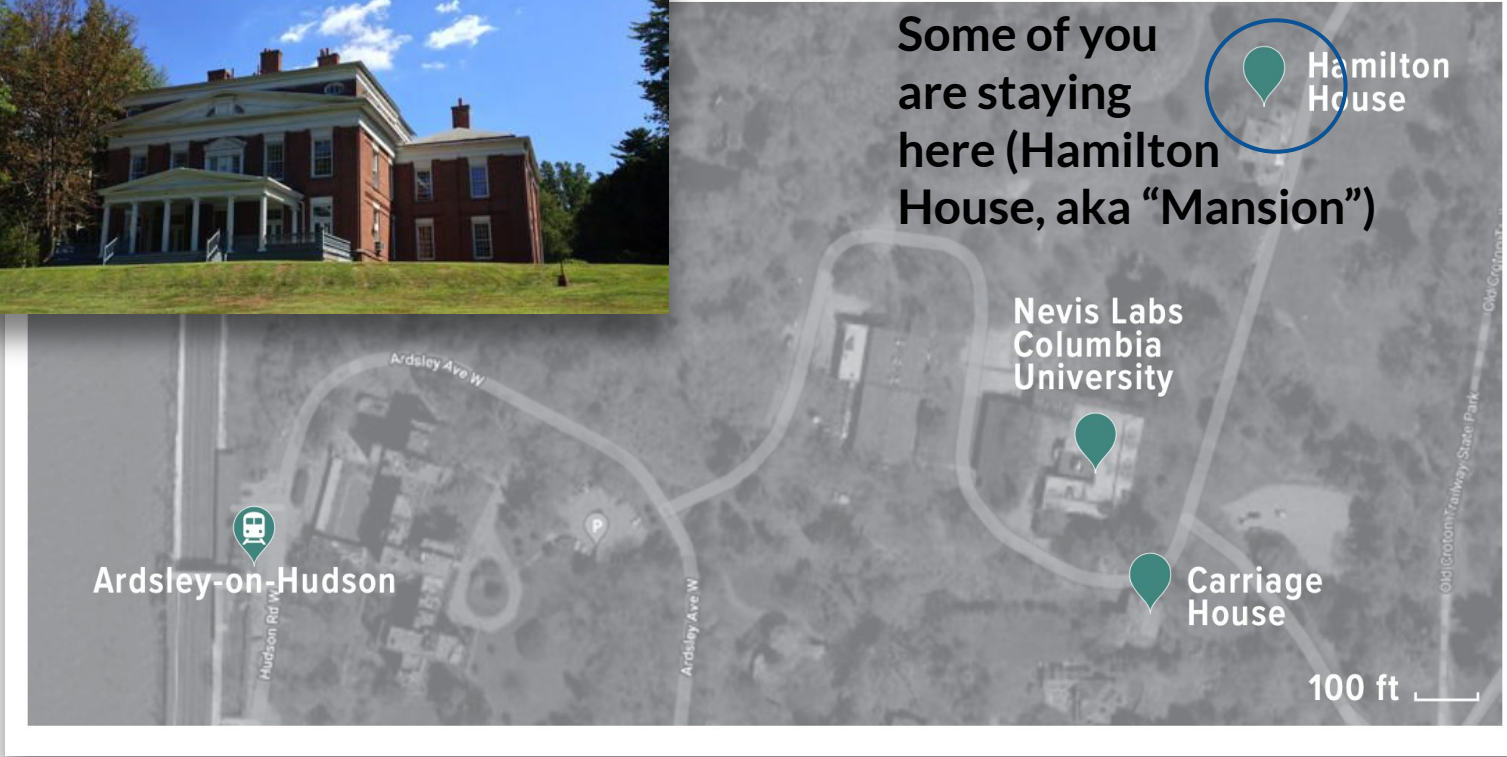
Nevis Library

Nevis REU Room

Each is equipped with smartboard
and speaker/microphone



And now... logistics!

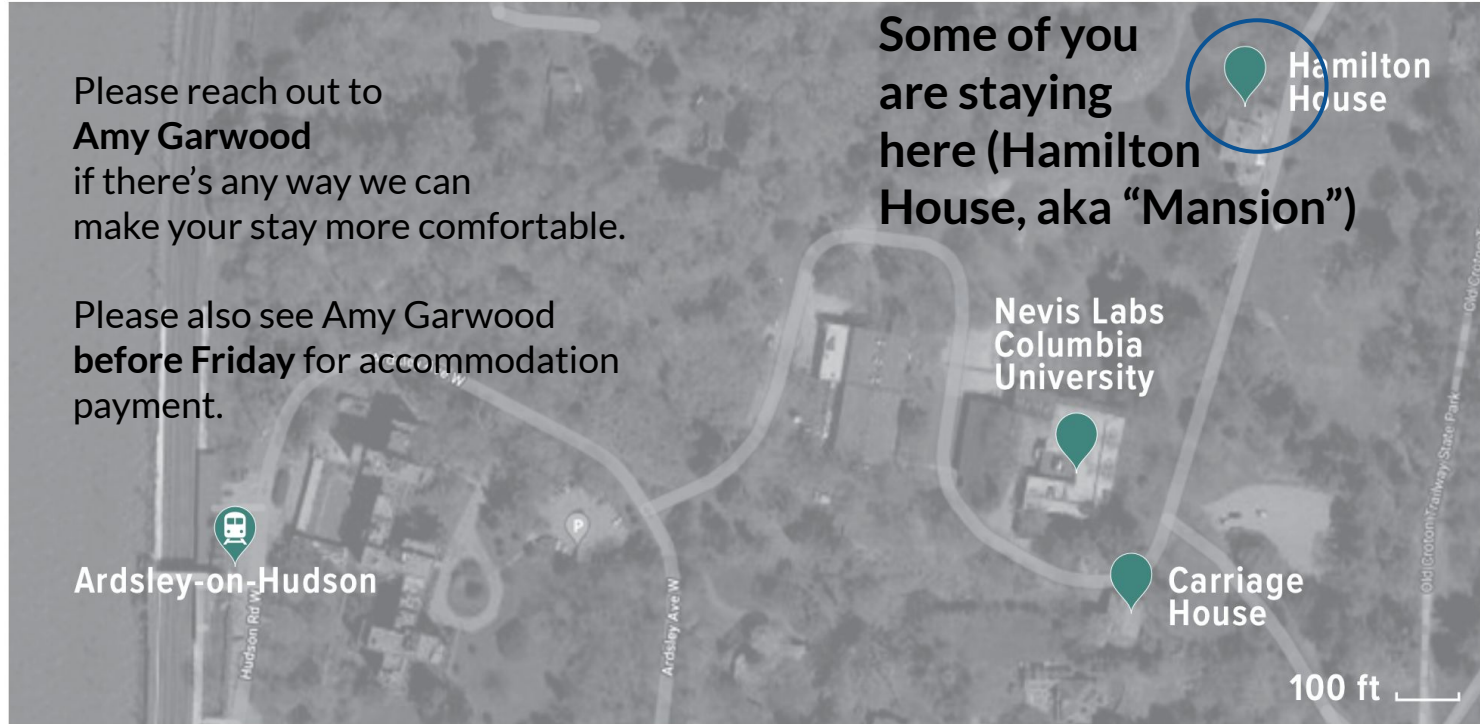


And now... logistics!

Please reach out to
Amy Garwood
if there's any way we can
make your stay more comfortable.

Please also see Amy Garwood
before Friday for accommodation
payment.

Some of you
are staying
here (Hamilton
House, aka “Mansion”)

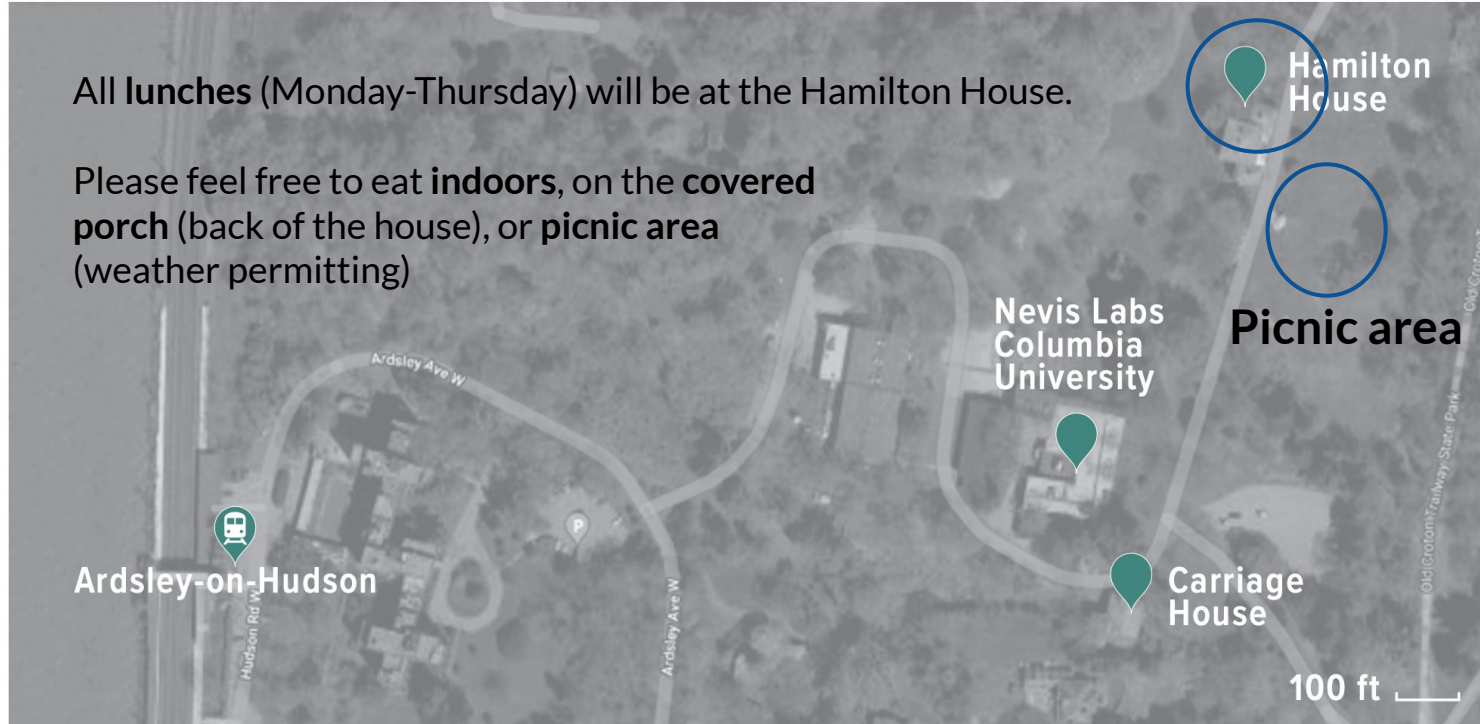


ALFRED P. SLOAN
FOUNDATION

And now... logistics!

All **lunches** (Monday-Thursday) will be at the Hamilton House.

Please feel free to eat **indoors**, on the **covered porch** (back of the house), or **picnic area** (weather permitting)



Transportation to/from Manhattan

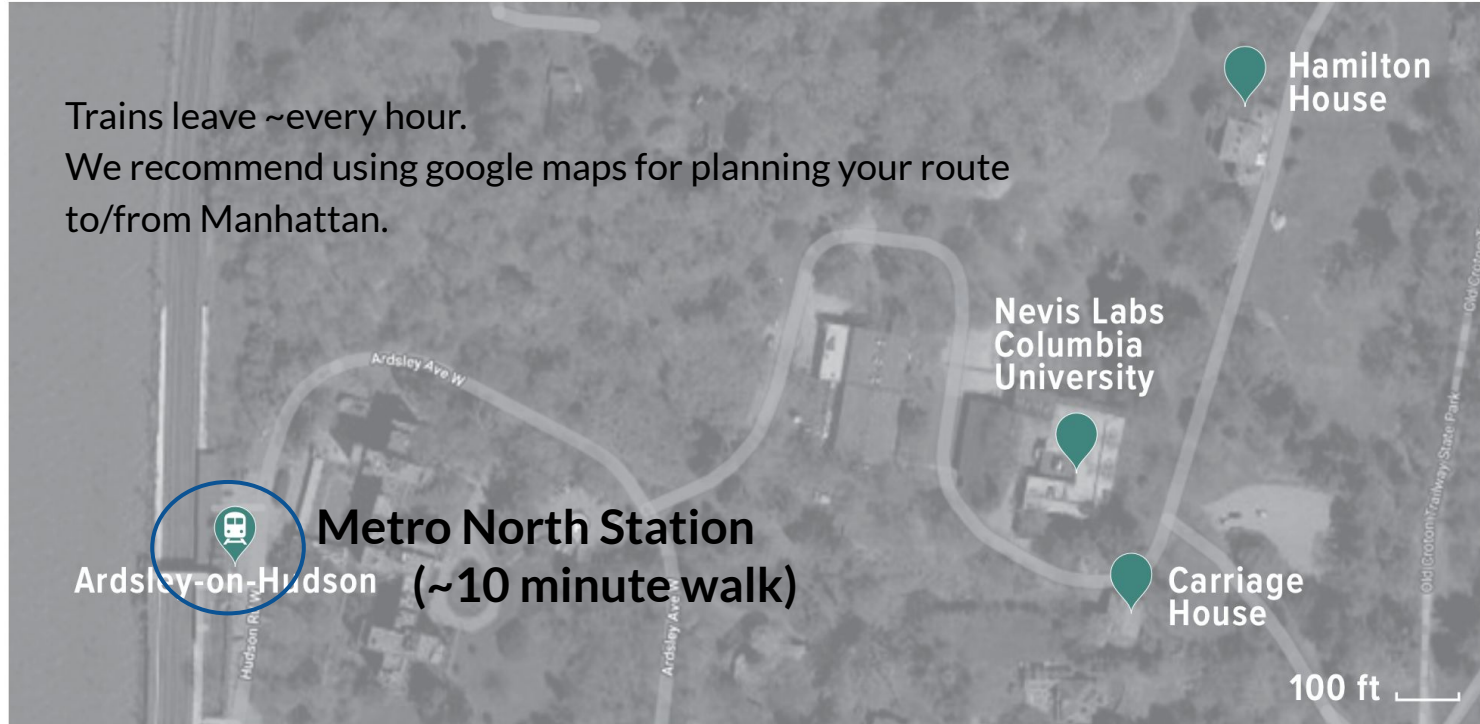
- Nevis Labs is located approximately 20 miles from the main Columbia campus in Manhattan
- Accessible to/from Manhattan by public transportation (~1-1.5 hrs)
- Metro North Schedule:
<https://www.mta.info/schedules>
Choose: Ardsley-on-Hudson to Harlem-125th or Marble Hill or Grand Central station

An aerial map of the Ardsley-on-Hudson area. A green pin marks the 'Ardsley-on-Hudson' Metro North Station, which is circled in blue. Another green pin marks 'Nevis Labs Columbia University'. Other labels on the map include 'Hamilton House', 'Carriage House', 'Hudson River', 'Ardsley Avenue', and 'Old Croton Railway State Park'. A scale bar for 100 ft is in the bottom right.
Metro North Station
Ardsley-on-Hudson (~10 minute walk)

Transportation to/from Manhattan

Trains leave ~every hour.

We recommend using google maps for planning your route to/from Manhattan.



(Optional) Social Activities

Overview
Timetable
My Conference
My Contributions
Registration
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Code of Conduct
Workshop Photo
Social Activities

Some suggestions:

- Ride the Staten Island Ferry and see the Statue of Liberty
- Walk along the Brooklyn Bridge for views of Manhattan
- Walk along the Highline
- Museum of Arts and Design [pay as you wish] on Thursdays 6pm until 9pm
- MoMA [free] on Friday 4pm until close time
- Rubin Museum [free] on Friday 6pm - 10pm



Additional information

Workshop photo: Before lunch **TODAY**, at the front of the Research Bldg.

Wifi: Research Building or Research Building 5G **Wifi Password:** [on the wall]

Let's have a great workshop!

Reminder!



If you haven't already, please don't forget to pay for your **registration fee** using the following webform:

<https://securepay.cuit.columbia.edu/payment/pub/SBN-ML-2025/>

(or in person to Amy Garwood in the Research Building, or using the QR code)