

NF09 - Artificial Neutrino Sources

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- Our group focuses on the **development, characterization and understanding of manmade neutrino sources**
- A total of 67 LOIs fall under our group’s purview:
 - We are currently the **primary** group within the NF for **14** of them:

Unique ID	Title	Subcategory
<u>AF092</u>	<i>Versatile Multi-MW Proton Facility with Synchrotron Upgrade of Fermilab Proton Complex</i>	Conventional neutrino beams
<u>AF025</u>	<i>The Need for Research into Early Conceptual Integration and Optimization, and Maturity evaluation of Future Accelerators</i>	Conventional neutrino beams
<u>NF116</u>	<i>The use of Precision Beam Timing in LBNF/ DUNE.</i>	Conventional neutrino beams
<u>NF173</u>	<i>The EMPHATIC Table-Top Spectrometer: Enabling Hadron Scattering and Production Measurements for Improved Beam Simulations</i>	Hadron production and ancillary measurements
<u>NF069</u>	<i>The future NA61/SHINE program on hadron production</i>	Hadron production and ancillary measurements

(Unique ID numbers link to the LOI pdf)

– NF09 topical group **primary** LOIs, continued:

Unique ID	Title	Subcategory
<u>NF062</u>	<i>The ESS neutrino Super Beam Design Study (ESSnuSB) and the High Intensity Frontier Initiative (HIFI)</i>	Spallation neutron sources
<u>NF108</u>	<i>ORNL Neutrino Sources for Future Experiments</i>	Spallation neutron sources
<u>NF140</u>	<i>High-Resolution Multiphysics Reactor Modeling for the Antineutrino Source Term</i>	Nuclear Reactors
<u>NF117</u>	<i>Prediction and Measurement of the Reactor Neutrino Flux and Spectrum</i>	Nuclear Reactors
<u>NF035</u>	<i>The JUNO-TAO Experiment</i>	Nuclear Reactors
<u>NF086</u>	<i>Legacy of the Daya Bay Reactor Antineutrino Experiment</i>	Nuclear Reactors
<u>AF121</u>	<i>Progress with the IsoDAR Cyclotron</i>	Novel sources
<u>NF047</u>	<i>The IsoDAR (Isotope Decay At Rest) ν-e-bar source</i>	Novel sources
<u>NF038</u>	<i>Physics with Electron Capture Neutrino Sources</i>	Novel sources

(Unique ID numbers link to the LOI pdf)

- There are several other LOIs involving the development of artificial sources and/or their characterization that are also very high on our radar:

Unique ID	Title	Subcategory	Relevance to NF09
NF187	<i>The Hyper-Kamiokande Experiment</i>	Conventional neutrino beams	uses J-PARC beam
NF145	<i>The NOvA Physics Program through 2025</i>	Conventional neutrino beams	discusses NuMI beam upgrades
NF130	<i>T2K Experiment: future plans and capabilities</i>	Conventional neutrino beams	discusses T2K beam upgrades
IF095	<i>Coherent LOI 5: Instrumentation Development</i>	Hadron production and ancillary measurements	includes D20 detector to determine neutrino flux
NF118	<i>3D-projection Scintillator Tracker (3DST) in SAND, a DUNE Near Detector Subsystem</i>	Hadron production and ancillary measurements	Instrumentation to monitor neutrino beam
EF038	<i>FASER 2: Forward Search Experiment at the HL LHC</i>	Novel sources	LHC as a source for TeV neutrinos
NF126	<i>Tau Neutrino Physics</i>	Novel sources	new sources for tau neutrino physics?
NF080	<i>Neutrino Physics with IsoDAR</i>	Novel sources	us of proposed novel source (IsoDAR)
NF082	<i>Neutrinos from stored muons; nuSTORM</i>	Novel sources	stored muon ring source
RF099	<i>Fixed-Target Searches for New Physics with O(1 GeV) Proton Beams at Fermi National Accelerator Laboratory</i>	Conventional neutrino beams	possible beam dump facility at Fermilab

(Unique ID numbers link to the LOI pdf)

– LOIs high on NF09’s radar, continued:

Unique ID	Title	Subcategory	Relevance to NF09
<u>AF215</u>	<i>LANSCCE-PSR Short-Pulse Upgrade for Improved Dark Matter and Sterile Neutrino Searches</i>	Spallation neutron sources	possible beam upgrade to search for steriles and dark matter
<u>NF128</u>	<i>The JSNS² Experiment</i>	Spallation neutron sources	use of spallation neutron source
<u>NF095</u>	<i>Future COHERENT physics program at the SNS</i>	Spallation neutron sources	relies on potentially upgradable spallation neutron source
<u>NF111</u>	<i>COHERENT Sensitivity to Dark Matter</i>	Spallation neutron sources	relies on potentially upgradable spallation neutron source
<u>NF067</u>	<i>Far-Future COHERENT physics program at the SNS</i>	Spallation neutron sources	relies on potentially upgradable spallation neutron source
<u>NF161</u>	<i>Neutrino Opportunities at the ORNL Second Target Station</i>	Spallation neutron sources	potential offered by neutrino source

(Unique ID numbers link to the LOI pdf)

– LOIs high on NF09’s radar, continued:

Unique ID	Title	Subcategory	Relevance to NF09
<u>NF034</u>	<i>The JUNO Experiment</i>	Nuclear reactors	Reactor physics at JUNO + possibility of cyclotron source
<u>NF185</u>	<i>Reactor and Geo Neutrinos at SNO+</i>	Nuclear reactors	Reactor antineutrino measurements at SNO+
<u>NF075</u>	CHANDLER: A Technology for Surface-level Reactor Neutrino Detection	Nuclear reactors	characterization of reactor antineutrino emission
<u>NF168</u>	<i>Forthcoming Science from the PROSPECT-I Data Set</i>	Nuclear reactors	characterization of reactor antineutrino emission
<u>NF169</u>	<i>The Expanded Physics Reach of PROSPECT-II</i>	Nuclear reactors	characterization of reactor antineutrino emission
<u>NF128</u>	<i>Mutual Benefits derived from the Application of Neutrino Physics to Nuclear Energy & Safeguards</i>	Nuclear reactors	characterization of reactor antineutrino emission
<u>NF184</u>	<i>ROADSTR: A Mobile Antineutrino Detector Platform for enabling Multi-Reactor Spectrum, Oscillation, and Application Measurements</i>	Nuclear reactors	characterization of reactor antineutrino emission

- [Feel free to take a look if you are interested \(click on the links\)](#)
- [Let us know if you have feedback for us! \(bear in mind that there are other “tertiary” LOIs in our radar that are not listed here\)](#)

Going Forward

– We plan to hold a workshop in early December:

- Three days: **December 2-4 (W-F)**
- Virtual, 3-4 hours per day, morning US time
- Organized around list of “big topics” (different colors) from previous lists
- Open to all, talks most likely by invitation only

nuclear reactor session
likely held jointly with
NF07 (applications)
group

details to be
announced soon!

– Also plan to continue coordinating with the accelerator frontier (AF):

- Started having regular meetings with the AF02 (accelerators for neutrinos) group
- Need to understand accelerator requirements associated with various neutrino physics goals
- Tentative plan is to have a 90 minute joint session during the CPM with AF02 and AF07 (accelerator technology R&D)
 - Session is titled “Energy and Power and Time structure goals for neutrino frontier programs”

get in touch with us, even if you
did not submit an LOI

– Join the [SNOWMASS-NF09-ARTIFICIAL-SOURCES](#) list!

– Get in touch with us (names in p1 are clickable)