



SCIENCE AT THE LUMINOSITY FRONTIER: JEFFERSON LAB AT 22 GEV

LABORATORI NAZIONALI DI FRASCATI – INFN (ITALY)
DECEMBER 9-13, 2024

The workshop will focus on the continuing development of the scientific case for a 22 GeV upgrade to CEBAF at Jefferson Lab.

This workshop will showcase the continued staff and user community efforts to develop increasingly realistic projections for experiments that would become possible with an energy upgrade that maintains the *world-leading luminosity* of CEBAF.

Development of a Science Case for an Energy Upgrade

International Workshops

March-Sep 2022

J-FUTURE
March 28, 2022 - March 30, 2022 • Messina, Italy

APCTP Focus Program in Nuclear Physics 2022: Hadron Physics Opportunities with JLab Energy and Luminosity Upgrade
APCTP, Peking

OPPORTUNITIES WITH JLAB ENERGY AND LUMINOSITY UPGRADE
26 September 2022 — 30 September 2022
ECTP - Villa Tambosi

Effort started in 2022 in preparation of the 2023 US NP Long Range Plan

Summer Series @ Jun-Aug 2022

Hadron Spectroscopy with CEBAF Energy Upgrade

The Next Generation of 3D Imaging

Mid x: Anti-shadowing and the Role of the Sea

J/Psi and Beyond

Physics Beyond the SM

Science at the Luminosity Frontier: JLab

January 23-25, 2023

- Spectra and structure of heavy and light hadrons as probes of QCD
- Sea and valence partonic structure and spin
- Form Factors, Generalized Parton Distributions and Energy-Momentum Tensor
- Fragmentation, Transverse Momentum and Parton correlations
- Hadron-quark transition and nuclear dynamics at extreme conditions
- Low-energy tests of the Standard Model and Fundamental Symmetries

<https://www.jlab.org/conference/luminosity22gev>

APS April Meeting 2023
Apr 15 & 16, 2023

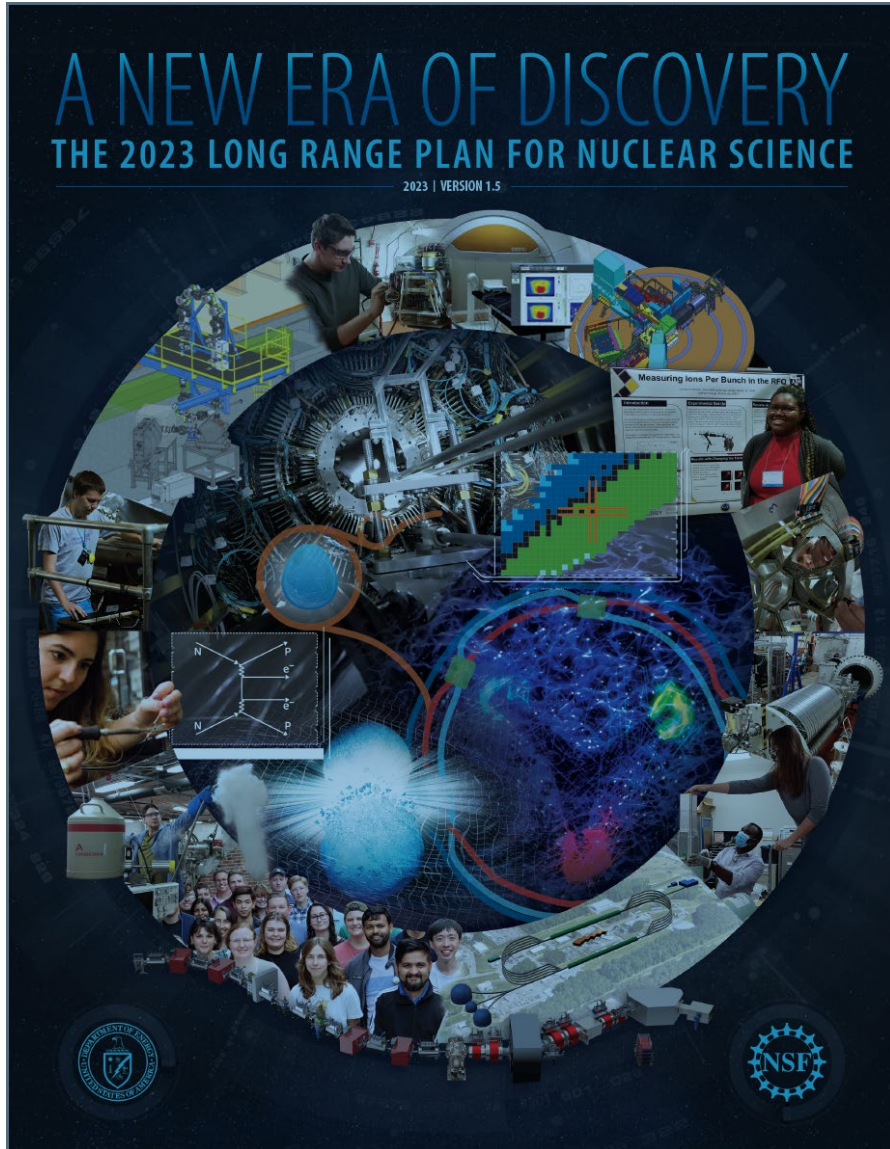
**B15/K16 Mini-Symposium:
Opportunities with Jlab
Upgrades in Energy,
Luminosity and a Positron
Beam**

The Outcome

Highlighted in the 2023 US Long Range Plan for Nuclear Science:

*“Recently, the Cornell Brookhaven Electron Test Accelerator (CBETA) facility demonstrated eight-pass recirculation of an electron beam with energy recovery employing arcs of fixed-field alternating gradient magnets. **This exciting new technology could enable a cost-effective method to double the energy of CEBAF...**”*

The 22 GeV energy upgrade “...will allow access to a new sector of hadron spectroscopy and offer an unprecedented view of the complex nucleon structure in the valence region, one not accessible at other machines.”



EPJ A

White Paper (~450 authors)

Hadrons and Nuclei

Eur. Phys. J. A 60 (2024) 9, 17

10 most recent

All issues

Topic Collections

Reviews

Letters

Viewpoints & Perspectives

Code Papers

Eur. Phys. J. A (2024) 60: 173

<https://doi.org/10.1140/epja/s10050-024-01282-x>

Review

Strong interaction physics at the luminosity frontier with 22 GeV electrons at Jefferson Lab

A. Accardi¹, P. Achenbach², D. Adhikari³, A. Afanasev⁴, C. S. Akondi⁵, N. Akopov⁶, M. Albaladejo⁷, H. Albataineh⁸, M. Albrecht², B. Almeida-Zamora⁹, M. Amarian¹⁰, D. Androić¹¹, W. Armstrong¹², D. S. Armstrong¹³, M. Arratia¹⁴, J. Arrington¹⁵, A. Asaturyan¹⁶, A. Austregesilo², H. Avakian², T. Averett¹³, C. Ayerbe Gayoso¹³, A. Bacchetta¹⁷, A. B.

Moving Forward...

- A small study group (11 people) from Lab management, Physics, Accelerator and Theory Divisions, and 3 representatives of the user community, meets monthly
 - Define the roadmap for the development of the positrons and the 22 GeV beams technology
- Bi-weekly meetings open to the whole community
https://wiki.jlab.org/jlab22/index.php/22_GeV_Open_Discussion
- The goal is to refine the scientific case for the 22 GeV upgrade
 - Aim for 15 minutes of presentation followed by a critical discussion necessary to develop a strong scientific argument
 - Slides and also some notes and questions posted on the wiki

In preparing your talks for this workshop, we hope you have found helpful to look through some of the questions and discussion points. We imagine that we will revisit them in the presentations and parallel discussion. They are definitely not an "all-inclusive" list of questions!

Program

	Monday	Tuesday	Wednesday	Thursday	Friday
MORNING	Spectroscopy	Partonic structure and spin	Spatial Structure, Mech. Properties, and Emergent Hadron Mass	Nuclear Dynamics	<ul style="list-style-type: none"> • General Interest talks • 22 GeV Accelerator • Positrons • Summary talks • Path forward
		Hadronization and Transverse Momentum			
Lunch	Lunch	Lunch	Lunch	Lunch	
AFTERNOON	Partonic structure and spin	Hadronization and Transverse Momentum	EXCURSIONS	QCD confinement, Fund. Symmetries and BSM	
	WELCOME PARTY	3 PARALLEL SESSIONS	SOCIAL DINNER	3 PARALLEL SESSIONS	

Welcome Party – Monday Dec 9

Scuderie Aldobrandini

Piazza Roma, Frascati



A seventeenth-century building which houses the Museo Tuscolano. Its collection includes ancient Roman artefacts and models of the Ville Tuscolane

Guided Tour during the reception



Bus transportation

- From LNF at **6 pm**, meeting in front of the building 36
- From Piazza Roma at **9 pm** to:
 - Hotel Villa Grazioli
 - Domus Park Hotel
 - Hotel Villa Mercede
 - Laboratori Nazionali di Frascati
 - Tor Vergata train station

Last train Frascati-Rome Termini: **22:36**

Last train Tor Vergata-Rome Termini: **23:13**

Excursions & Social Dinner – Wednesday Dec 11

Villa Mondragone



- Construction began in 1573 by Cardinal Mark Sittich von Hohenems Altemps

Abbazia di San Nilo



- Founded in the year 1004 of Greek-byzantine origins, houses an important Library containing more than a thousand ancient manuscripts and around 50.000 volumes
- The Abbey features the famous Laboratorio di Restauro del Libro Antico (Workshop for the conservation of ancient books) among which the “Atlatic Codex” by Leonardo da Vinci.

Guided Excursions

Social Dinner

Villa Grazioli



- Built in the 16th century (by commission of Cardinal Carafa, is a masterpiece of the Renaissance, home to prestigious historical frescoes that reflect centuries of art and culture

Practical Information

- **Registrations are open at the front desk**
- **Please, remember to upload the abstract of your talk or send it to marco.mirazita@Inf.infn.it**
- **Lunch at the canteen not before 1.30 pm**
Daily meal vouchers are inserted in the badge holder, to be handed over at the cashier
 - First Course
 - Second Course
 - Side Dish
 - Fruit
 - Bread
 - Dessert (when available)