



# A Strategy for SRF

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# Committee Charge

3. The laboratory has extensive capabilities in superconducting linac and associated technologies. JLab plays a major role in the LCLS-II Project as one of the partner laboratories. Please assess the technical progress in the laboratory's accelerator R&D and LCLS-II activities, with particular attention to the following:
- **Is the lab's strategy for maintaining a world-leadership position in SRF well-formulated?**

## From July 2017 S&T Review

### Recommendations:

- Develop an integrated and cost-effective strategy for maintaining a world-leadership position in SRF. Such a strategy should encompass:
  - a) a coherent plan for operational improvements;
  - b) an R&D program with a well-defined focus that leverages the unique strengths of the JLAB capabilities;
  - c) the utilization of existing world-class resources and capabilities, considering as well those becoming available at the completion of the LCLS II project; and, d) the already strong student program.
- Present to DOE by June 1, 2018.

# Components of a Strategic Plan

## What the Strategic Plan would look like

- An integrated set of tiered strategic objectives, ideally nested under Lab level and Division level strategic objectives
  - Consistent with the Lab's, the Division's and SRF's mission
  - Integrated means R&D and Ops are effectively joined through objectives to achieve the desired, measureable results collaboratively
  - Integrated also means nested into the Lab's Agenda

**“Management by Objectives”**

# How to develop the Strategy

- **Define “World-leadership position in SRF” as a means to help define what we need to be leaders in**
  - We aspire to lead in areas that have the highest impact to JLab, DOE and the SRF community
    - Next generation accelerators (e.g. EIC), CEBAF performance, SRF community needs, commercial needs
  - Target areas should be derived from the physics needs for next generation accelerators
- **Conduct an SRF “self assessment”**
  - Strengths
    - People, programs, infrastructure
    - What we are good at today
- **Gap analysis to what we are good at today to what we need to be good at for the future**
  - Applies to all aspects of SRF
- **Understand how the condition to be “cost effective” affects the strategy**

# Strategic Objectives

- **Develop SOs that address the gaps, support the needs for JLab (current and future) and propel us towards being leaders in targeted areas**
  - **Must nest into Lab's Agenda**
  - Clearly stated in a means that they can be measured and graded
  - Approved and sanctioned by Lab leadership
  - Clearly defined time phased success criteria
  - Periodic reviews with assessments, grades (performance to plan) and data driven adjustments (compelling reasons for change) - Could be at Lab level
- **Leverage an Advisory Committee to gain guidance on our programs and areas of emphasis, matching our efforts to our SOs and the needs of future accelerators**
  - Provides an external view point and long term continuity

# Considerations

## Leverage Traditional Strengths

- Highly experienced workforce in both R&D and project scale production (CEBAF, FEL, SNS, ILC, 12 GeV, APSU, LCLS-II etc..)
- High throughput, rapid turnaround cryogenic testing capability
- Rapid prototyping and development capability
- Unique “Soup to Nuts” capability under one roof
- Strong education component
- Strong community ties and collaborations

## Recognize Challenges

- Increasingly obsolete production and R&D infrastructure
- Aging workforce – no real succession planning
- Flat budgets with increasing cost and overheads
- Increasing reliance on WFO
- Increasing national and global competition

# TJNAF FY2018 Laboratory Agenda (Draft)

## Thomas Jefferson National Accelerator Facility (Jefferson Lab) FY 2018 Laboratory Agenda

| Mission                                      | We support the DOE Office of Science and serve the Nuclear Physics User Community as a world-leading center for fundamental nuclear science and associated technologies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strategic Outcomes<br>(Science & Technology) | <i>Enable scientific discoveries by the Nuclear Physics User Community through our unique, world leading facilities and capabilities</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <i>Plan for future facilities and capabilities to realize the long-term scientific goals in Nuclear Physics research</i>                                                                                                                                                                                                                              | <i>Provide technology solutions that support the NP community, the larger DOE mission and societal needs</i>                                                                                                                                                                                                                                                     |
| Major Initiatives                            | <ul style="list-style-type: none"> <li>• Operate CEBAF accelerator and experimental facilities to execute the FY18 experimental nuclear physics program</li> <li>• Prepare CEBAF accelerator and experimental equipment for future 3-5 year experimental physics program</li> <li>• Perform R&amp;D to enable enhanced performance and future new capabilities for CEBAF and experimental halls.</li> <li>• Perform theoretical research in support of the CEBAF 12 GeV experimental program</li> <li>• Perform theoretical research in support of the broader NP research community</li> <li>• Provide computational resources for theoretical and experimental nuclear physics research</li> </ul> | <ul style="list-style-type: none"> <li>• Continue to develop the MOLLER and SoLID initiatives</li> <li>• Perform Accelerator R&amp;D towards an Electron Ion Collider</li> <li>• Perform Detector R&amp;D towards an Electron Ion Collider</li> <li>• Continue pre-project design and planning activities towards an Electron Ion Collider</li> </ul> | <ul style="list-style-type: none"> <li>• Execute LCLS-II activities to produce project deliverables</li> <li>• Perform R&amp;D to enable other future (non-CEBAF, non-EIC) accelerator capabilities</li> <li>• Perform R&amp;D on topics with potential commercial applications to facilitate transfer of the Lab's technology beyond nuclear physics</li> </ul> |

# Summary

- A recommendation from the July 2017 S&T review was for the Lab to develop a cost-effective strategy for maintaining a world-leadership position in SRF
  - Challenges include determining what “world-leadership” means and how to achieve it in a “cost-effective” manner
- The Lab’s Agenda provides the frameworks for developing a set of Strategic Objectives for SRF that can be nested into the higher level Strategic Outcomes and Major Initiatives
  - Strategic Objectives will be sanctioned by Lab leadership
- A desired outcome of developing a sanctioned Strategy would be a reassessment of priorities and commitment of resources to achieve all of the Lab’s Agenda



# Backup Material

# What does “world leadership position in SRF” mean?

- Competence in executing state-of-the-practice integrative SRF technology \*
- Maintaining and exploiting near peerless technical infrastructure required to develop and implement SRF technology
- Making significant innovative progress pushing the state-of-the-art in particular aspects of SRF technology
- Maintaining strong links to LLRF, cryo, and beam physics for system integration and specification coherence
- Serving the community via technical training and technology transfer

## **\* Competence executing state-of-the-practice integrative SRF technology means:**

- Able to confidently design, specify, fabricate, process, and test new concept SRF cavities for specific purposes.
- Expert in cavity materials specification, surface characterization, and materials and surface processing, understanding and tailoring these to obtain required performance.
- Able to develop, design, assemble, test, deploy, and maintain SRF accelerator cryomodules to meet application specifications.