

# The Tenth International Particle Accelerator Conference

## PARTICLE ACCELERATOR PROJECTS & UPGRADES BOOKLET



**19 - 24 May 2019**

**MCEC**

**Melbourne Australia**



# Particle Accelerator Projects and Upgrades

For Industry Collaboration in the Field of  
Particle Accelerators

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11<sup>th</sup> Edition

Compiled by

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# Introduction

For many years, the European Physical Society Accelerator Group (EPS-AG) that organizes the IPAC series in Europe has contacted major laboratories around the world to invite them to provide information on future accelerator projects and upgrades to exhibitors present at IPAC commercial exhibitions. This initiative has resulted in a series of booklets that is available to industry at the conferences or online.

We would like to acknowledge the former EPS-AG Executive Secretary and IPAC Conference Organizer for Europe, Christine Petit-Jean-Genaz, who has played a leading role in setting up this initiative and in pursuing it over more than two decades.

This current edition builds on previous editions with updated information provided by the laboratories and research institutes. We would also like to acknowledge and thank everyone for contributing to this booklet in an effort to foster a closer collaboration between research and industry.

All of the information contained in this booklet is subject to confirmation by the laboratory and/or contact persons for each project.

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# Project Region: Americas

## Advance Rare Isotope Facility - ARIEL-II

Project Location:	Canada
Project Type:	Upgrade project
Project Description:	<p>ARIEL was conceived as a two-stage rare isotope beam (RIB) project. The first stage, ARIEL-I, funded in 2010 included the ARIEL building and a superconducting cw-electron linear accelerator, designed to deliver 10mA electron beams at 50MeV. An initial stage is in place to deliver 3mA beams at 30MeV. The second stage, ARIEL-II, will increase the scientific productivity by exploiting the new electron accelerator to produce a wider variety of exotic isotope species at higher intensities and to deliver multiple beams in parallel. The project comprises a new proton beam line for a 100 <math>\mu</math>A proton beam from the existing cyclotron to the new isotope production facility in the ARIEL building, the ARIEL-I SRF e-linac completion to its design specifications, the new high power target stations for the electron and proton beams and the beam transport systems to deliver the radioactive ion beams from the two new target stations to the existing experimental stations.</p>
Requirements List Available:	Yes
Approval Date:	06-Oct-2016
Status of Contracting:	50% of the items are contracted

Construction scheduled to start:	01-Oct-2017
Estimated Project Cost:	45 M CAD
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	Target ion sources, target hall infrastructure (hot cells, shielding etc.), vacuum components, RF-equipment, beam diagnostics, beamline magnets

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## Advanced Photon Source Upgrade

Project Location:	Argonne National Laboratory, United States of America
Project Type:	Upgrade
Project Description:	The APS Upgrade replaces the existing APS storage ring with a multi-bend achromat lattice including reverse bends. In addition, insertion devices and beamlines are upgraded to exploit the new source properties.
Requirements List Available:	Yes
Approval Date:	13-Dec-2018
Status of Contracting:	15% of the items are currently contracted.
Construction scheduled to start:	FY2019
Estimated Project Cost:	815M USD
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	Storage Ring components and systems including vacuum, magnets, and power supplies, insertion devices, and optics and detectors for beamlines

Project Leader(s):	Mr. Robert Hettel
Affiliation:	Argonne National Laboratory
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Contact Person(s):	Same as Project Leader(s)
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## BELLA Second Beamline and High Intensity Interaction Point

Project Location:	United States of America
Project Type:	Accelerator Improvement Projects
Project Description:	<p>Two projects are extending the capability of the BELLA Center facility to advance the capability to develop Laser-Plasma Accelerators, based around the Center's Petawatt laser. The existing facility features a single long focal length laser beamline which has been used to accelerate electrons up to 7.8 GeV, and protons up to several MeV. The first project will enable splitting of the laser pulse to deliver two independent pulses to the interaction point, supporting chaining of two laser-plasma accelerator stages at the multi-GeV level. This will be a critical step in establishing that such accelerators can meet future collider needs. It extends the existing program which is aligned to address the principal issues for a future lepton or photon collider at or above the TeV scale, including efficiency, beam quality, and energy gain. The second project will install a short focal length interaction chamber on the system. This will enable testing of novel ion acceleration regimes such as radiation pressure, to reach higher energies and beam quality. The two projects will also create a versatile facility enabling a broad range of other experiments at high repetition rate and precision.</p>
Requirements List Available:	Yes
Approval Date:	2018

Status of Contracting:	Major procurements in progress
Construction scheduled to start:	2019
Estimated Project Cost:	XX M (USD/EURO/YEN/CNY...)
Estimated Construction Time:	2 years
Type of Equipment to be Purchased:	Vacuum components, laser optics and compressors

Project Leader(s):	Eric Esarey (PI) Cameron Geddes (Technical lead) Gregg Schaffstein (Project Manager)
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**CBETA**

Project Location:	United States of America
Project Type:	New Project
Project Description:	The Cornell-BNL ERL Test Accelerator (CBETA) is a four-turn Energy Recovery Linac (ERL) with a single return loop of Fixed-Field Alternating-gradient optics, using superconducting RF technology and permanent magnets. It is constructed at Cornell University in collaboration with BNL.
Requirements List Available:	Yes
Approval Date:	31-Oct-2016
Status of Contracting:	Beam commissioning is about to start.
Construction scheduled to start:	01-Jan-2017
Estimated Project Cost:	25 M USD
Estimated Construction Time:	3.5 years
Type of Equipment to be Purchased:	Permanent combined-function Halbach magnets, electromagnets, vacuum system, power supplies, RF power amplifiers, beam diagnostics.

Project Leader(s):	Georg Hoffstaetter, Dejan Trbojvic
Affiliation:	Cornell and BNL (respectively)
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Contact Person(s):	Same as Project Leader(s)
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# eRHIC

Project Location:	United States of America
Project Type:	New Project
Project Description:	Electron-Ion Collider for luminosities of $L = 1034 \text{ cm}^{-2}\text{s}^{-1}$ , with electrons up to 18 GeV and ions up to 100 GeV/nucleon or 275 GeV protons using the RHIC accelerator complex.
Requirements List Available:	No
Approval Date:	TBD
Status of Contracting:	Not ready for procurement
Construction scheduled to start:	TBD
Estimated Project Cost:	TBD
Estimated Construction Time:	TBD
Type of Equipment to be Purchased:	Super conducting RF equipment, cryogenic equipment, superconducting and room temperature magnets, vacuum components.

Project Leader(s):	Ferdinand Willeke (BNL)
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## Electron-Ion Collider/JLEIC

Project Location:	United states of America
Project Type:	New Project
Project Description:	Electron-ion collider with wide array of ion species (p to Pb), variable center of mass energy (20-140 GeV), high luminosity ( $1e33$ - $1e34$ cm <sup>-2</sup> s <sup>-1</sup> ), and high polarization (>70%)
Requirements List Available:	Yes
Approval Date:	TBD
Status of Contracting:	First priority for new construction in US DOE Nuclear Physics Long Range Plan
Construction scheduled to start:	TBD
Estimated Project Cost:	TBD
Estimated Construction Time:	7+ years
Type of Equipment to be Purchased:	Jefferson Lab: new ion complex (polarized sources, ion booster, variable bunch length ion diagnostics), electron collider ring, high-performance feedback systems

Project Leader(s):	Andrei Seryi
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Contact Person(s):	Same as Project Leader(s)
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# Facility for Advanced Accelerator Experimental Tests II (FACET-II)

\*No update provided in 2019

Project Location:	United States of America
Project Type:	
Project Description:	The National User Facility for Advanced Acceleration Research will be an experimental user facility with the electron and positron beams required to advance the development of plasma wakefield acceleration and support a broad range of other experiments requiring high-energy, high density beams. It will provide short, intense pulses of electrons or laser radiation to excite plasma wakefields with sufficient amplitude to accelerate electrons by 10 GeV or more in approximately one meter of plasma. The plasma program has been designed to address critical technical issues for very compact, multi-TeV, plasma-based accelerators. Among these issues are: high accelerating gradients, electrical efficiency, operating plasma accelerating modules in series to achieve high beam energies and quality of the accelerated beam.
Requirements List Available:	Yes
Approval Date:	
Status of Contracting:	
Construction scheduled to start:	1-Oct-17
Estimated Project Cost:	46.6 M USD

Estimated Construction Time:	3 years
Type of Equipment to be Purchased:	Magnets, vacuum components, various diagnostics

Project Leader(s):	Vitaly Yakimenko
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Contact Person(s):	Same as Project Leader(s)
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## Facility for Rare Isotope Beams (FRIB)

Project Location:	United States of America
Project Type:	New Project
Project Description:	Rare isotope research project based upon a heavy ion driver linac to accelerate all stable isotope beams to a beam power of 400 kW, a beam energy over 200 MeV/nucleon
Requirements List Available:	Yes
Approval Date:	01-Aug-2014
Status of Contracting:	90% contracted
Construction scheduled to start:	01-Mar-2014
Estimated Project Cost:	730 M USD
Estimated Construction Time:	7 years
Type of Equipment to be Purchased:	Cryoplant components, cryostat components, target and preseparator subcomponents, RF components, magnets, power suppliers, vacuum, controls, instrumentation equipment.

Project Leader(s):	Thomas Glasmacher
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## IOTA/FAST facility

Project Location:	United States of America
Project Type:	New Project
Project Description:	Construction of accelerator R&D facility consisting of 40-m long e-/p+ storage IOTA ring and its 150-300 MeV/c e- injector based on ILC-type SRF cryomodule and 70 MeV/c RFQ based proton injector at Fermilab Accelerator Science and Technology (FAST) facility.
Requirements List Available:	Yes
Approval Date:	01-Mar-2014
Status of Contracting:	90% of the items are contracted
Construction scheduled to start:	01-Mar-2014
Estimated Project Cost:	20 M USD (last stage)
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	RF-equipment for proton RFQ, Vacuum equipment Advanced beam instrumentation

Project Leader(s):	Alexander Valishev
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## Linac Coherent Light Source II

Project Location:	United States of America
Project Type:	New Project
Project Description:	Construction of a 4 GeV CW superconducting linac and two new x-ray FEL undulator sources in the existing LCLS tunnels. Both the new SCRF linac and the original copper linac will continue to operate. Using both linacs, the new undulators will produce x-rays in the range 200-25,000 eV
Requirements List Available:	Yes
Approval Date:	14-Aug-14
Status of Contracting:	the Project is 82% complete
Construction scheduled to start:	21-Mar-16
Estimated Project Cost:	1.045 B USD
Estimated Construction Time:	5.5 years
Type of Equipment to be Purchased:	niobium cavities, all hardware for XFEL-type cryomodules, helium transfer lines, helium refrigeration system, undulators, x-ray optics, high-power solid state amplifier sources, lasers, iron/copper magnets

Project Leader(s):	John Galayda
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# Linac Coherent Light Source II High Energy Upgrade (LCLS-II-HE)

Project Location:	United States of America
Project Type:	Upgrade
Project Description:	Upgrade of the LCLS-II superconducting accelerator from 4 to 8 GeV. A low-energy extraction and separate electron transfer line will be included in the superconducting linac to permit quasi-independent operation of both hard and soft X-ray at high repetition rate. Also, the existing hard X-ray instruments in the LCLS experimental facility will be upgraded to make use of the high average power and high repetition rate FEL.
Requirements List Available:	Yes
Approval Date:	Conceptual design approved 27 September 2018
Status of Contracting:	The project is now developing its preliminary design and seeking authorization for long-lead procurements.
Construction scheduled to start:	2020 for long lead procurements 2023 for substantial construction
Estimated Project Cost:	\$368M USD
Estimated Construction Time:	4 years
Type of Equipment to be Purchased:	Niobium cavities, all hardware for LCLS-II style cryomodules, helium transfer lines, high-power solid state amplifier sources, lasers, iron/copper magnets, x-ray optics, large area and high rep-rate x-ray detectors,

Project Leader(s):	Greg Hays
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# Long Baseline Neutrino Facility (LBNF) Beamline

Project Location:	USA
Project Type:	New Project
Project Description:	LBNF Beamline is being built at Fermilab to deliver a high powered beam of neutrino's through the earth to detectors located 1 mile underground in western South Dakota with the goal of refining our understanding of this fundamental building block of nature
Requirements List Available:	Yes
Approval Date:	05-Nov-2015
Status of Contracting:	None of the items are contracted as of yet
Construction scheduled to start:	01-Jan-2020
Estimated Project Cost:	
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	Magnet power supplies, beam instrumentation, vacuum equipment and instrumentation, cooling plants, capacitor banks, beam windows, customized steel and polyethylene shielding, controls
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## Proton Improvement Plan-II (PIP-II)

\*No update provided in 2019

Project Location:	United States of America
Project Type:	New Project
Project Description:	Replacement of the existing 400-MeV linac at Fermilab with a CW-capable 800-MeV superconducting linac, accompanied by upgrades to the existing circular accelerators to support higher beam powers. This project will support long-term research goals in accelerator based neutrino and muon physics at Fermilab.
Requirements List Available:	Yes
Approval Date:	1-Nov-15
Status of Contracting:	R&D Phase
Construction scheduled to start:	1-Mar-19
Estimated Project Cost:	650 M USD
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	Superconducting RF acceleration modules RF sources Magnets (normal- and superconducting) Power supplies Vacuum equipment Cryogenic equipment Instrumentation

Project Leader(s):	Lia Meringa
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Contact Person(s):	Same as Project Leader(s)
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## Proton Power Upgrade

Project Location:	USA
Project Type:	Upgrade
Project Description:	PPU will double the beam power capability of the Spallation Neutron Source accelerator from 1.4 to 2.8 MW.
Requirements List Available:	no
Approval Date:	April 4 2018 (CD-1)
Status of Contracting:	Superconducting cavity contract is awarded, other areas are completing preliminary and final design reports, to be followed by initial procurements
Construction scheduled to start:	01-11-2020
Estimated Project Cost:	250 M USD
Estimated Construction Time:	4 years
Type of Equipment to be Purchased:	RF equipment (klystrons, high voltage PFNs,..), superconducting RF cryomodules, high power targetry, magnets

Project Leader(s):	John Galambos, project director
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## Sirius



Project Location:	Brazil
Project Type:	New Project
Project Description:	3GeV – 4th generation synchrotron light source
Requirements List Available:	NO
Approval Date:	01-Jan-2012
Status of Contracting:	99% of the items for the accelerators already contracted.
Construction scheduled to start:	01-Jul-2012
Estimated Project Cost:	100 M USD (accelerator only)
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	Accelerator commissioning in progress. Future purchase process will be related to second phase beamlines (optics, vacuum, ID's)

Project Leader(s):	Ricardo Rodrigues (accelerators only)
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# Project Region: Asia

## Australian Synchrotron beamlines expansion 'BRIGHT'

Project Location:	Australia
Project Type:	Upgrade
Project Description:	An expansion of the Australian Synchrotron's beamline suite, with 9 additional beamlines and associated equipment.
Requirements List Available:	Yes
Approval Date:	01-Jan-2018
Status of Contracting:	~30% contracted
Construction scheduled to start:	01-Jul-2019
Estimated Project Cost:	100 M AUD
Estimated Construction Time:	8 years
Type of Equipment to be Purchased:	Photon Beamlines – End stations, X-ray optics, Vacuum Vessels, X-BPMs, and associated support equipment. Insertion Devices.

Project Leader(s):	Michelle Jones-Lennon
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Project Region: Asia

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## Australian Synchrotron Maintenance

Project Location:	Australia
Project Type:	Project Upgrade
Project Description:	In addition to the normal operations funding, this project is to maintain and upgrade many accelerator and beamline components at the Australian Synchrotron.
Requirements List Available:	No
Approval Date:	1-Jul-16
Status of Contracting:	Ongoing as needs arise
Construction scheduled to start:	1-Oct-16
Estimated Project Cost:	50 M AUD
Estimated Construction Time:	10 years
Type of Equipment to be Purchased:	RF hardware systems including klystrons and low level RF electronics, beam diagnostics for linac, transfer lines, booster synchrotron and storage ring, power amplifiers, feedback systems, power supplies.

Project Leader(s):	Dr. Dean Morris
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## iBNCT Project

Project Location:	Japan
Project Type:	Project Upgrade
Project Description:	Development for the compact linac-based neutron source for boron neutron capture therapy (BNCT). Proton energy: 8 MeV, Average current: > 5 mA
Requirements List Available:	Yes
Approval Date:	24-Mar-2011
Status of Contracting:	Completed construction, Conditioning and improvement
Construction scheduled to start:	24-Mar-2011
Estimated Project Cost:	Approx. 25 M (USD)
Estimated Construction Time:	7 years
Type of Equipment to be Purchased:	Competitive funds

Project Leader(s):	Akira Matsumura
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## China Spallation Neutron Source

Project Location:	People's Republic of China
Project Type:	New Project
Project Description:	The CSNS facility is designed to provide multidisciplinary research.
Requirements List Available:	No
Approval Date:	3-Sep-2011
Status of Contracting:	Completed construction.
Construction scheduled to start:	20-Oct -2011
Estimated Project Cost:	1.86632 B CNY
Estimated Construction Time:	6.5 years
Type of Equipment to be Purchased:	A 80-MeV H- linac, a 1.6-GeV proton rapid cycling synchrotron (RCS), beam transport lines, a solid tungsten target station, and 3 initial instruments for the pulsed spallation .Beam power on target is 100kW.

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## Chinese ADS superconducting Front-end demo linac (CAFe)

Project Location:	People's Republic China
Project Type:	New Project
Project Description:	Chinese ADS Superconducting Front-end demo linac (CAFe) has been constructed to develop the key technologies of low-energy high-power sc-linac. It will demonstrate 5 to 10 mA Continuous-wave beam at 25 MeV. The sc-linac will be mainly to investigate the high reliability and availability of high-power sc-linac for China ADS project. It is composed of a 2.45-GHz ion source, a 162.5-MHz radio frequency quadrupole accelerator (RFQ), a medium energy beam transport line (MEBT), a superconducting accelerating section with four cryomodules which contains Half Wave Resonators (HWR) and Spoke resonators and a high energy beam transport line (HEBT). It will keep upgrading to achieve the goal of low trip-rate of ADS.
Requirements List Available:	Yes
Approval Date:	18-Jan-2011
Status of Contracting:	Upgrading components purchasing
Construction scheduled to start:	01-April-2011
Estimated Project Cost:	300 M CNY
Estimated Construction Time:	6 years

Project Region: Asia

Type of Equipment to be Purchased:	high power beam dump, beam instruments, beam loss monitors, high level applications, solid state rf amplifiers, LLRF, MPS
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Project Leader(s):	Hushan Xu
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## Chinese initiative Accelerator Driven System (CiADS)

Project Location:	People's Republic China
Project Type:	New Project
Project Description:	<p>CiADS is a research facility of a megawatt-class accelerator-driven subcritical system to demonstrate the feasibility of ADS and the key technologies of high power sc-linac, high power target, and heavy metal fast reactor. It consists of a continuous-wave superconducting proton LINAC with 500 MeV and 5 mA, a liquid LBE cooled fast reactor with 7.5 MWt, and a granular target employed to coupling the accelerator and the sub-critical core. The RFQ is 162.5MHz, 2.1 MeV and 4-vane structure. The superconducting linac has five families, 162.5 MHz half wave resonators of beta 0.1 and 0.19, 325 MHz double spoke resonators of beta 0.42, and 650 MHz elliptical resonators of beta 0.6 and 0.8. All resonators will be excited by solid state amplifiers with power range from 10 kW to 100 kW.</p>
Requirements List Available:	Yes
Approval Date:	30-Dec-2015
Status of Contracting:	Prototype purchasing
Construction scheduled to start:	July-2019
Estimated Project Cost:	1.8 B CNY

Project Region: Asia

Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	ECR ion source, RFQ, SRF resonators, beam diagnostic instruments, SC magnets, cryostats, r.t. magnets, vacuum components, RF-equipment, power suppliers, fundamental couplers, control devices, solid state rf amplifiers, LLRF devices, helium refrigeration system, high power beam dump, and so on.

Project Leader(s):	Hushan Xu
Affiliation:	IMP
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Contact Person(s):	Yuan He
Affiliation:	IMP
e-mail:	hey@impcas.ac.cn

## High Energy Photon Source (HEPS)

Project Location:	People's Republic of China
Project Type:	New Project
Project Description:	In construction.
Requirements List Available:	No
Approval Date:	28-June-2019
Status of Contracting:	
Construction scheduled to start:	01-Aug-2019
Estimated Project Cost:	4.8B CNY
Estimated Construction Time:	6.5 years
Type of Equipment to be Purchased:	Vacuum components, RF-equipment, beam diagnostics, magnets, power supplies, insertion device, beam line optics, etc.

Project Leader(s):	Qing Qin
Affiliation:	IHEP
e-mail:	qinq@ihep.ac.cn

Contact Person(s):	Same as Project Leader(s)
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## High Intensity Heavy Ion Accelerator Facility (HIAF) in China

Project Location:	People's Republic of China
Project Type:	New Project
Project Description:	HIAF (High Intensity heavy ion Accelerator Facility) is designed to provide intense beams of primary and radioactive ions for a wide range of research fields. High energetic highly bunched heavy ion beams are used to interact with dense plasma to probe the physics of nuclear fusion. Radioactive ion beams are used to investigate the structure of exotic nuclei, to learn more about nuclear reactions of astrophysics and to measure the mass of nuclei with high precision. Highly charged ions are used for atomic physics and a series of applied science. The unique features of the first phase of HIAF are high current CW heavy ion beams from the superconducting linac - iLinac, and 3~5Hz high intensity heavy ion beams from the 34 Tm synchrotron BRing. The purified rare isotope beams also will be prepared through projectile fragmentation (PF) method. The second phase of HIAF facility will be updated to the Electron ion collider of China (EicC) in the future.
Requirements List Available:	Yes
Approval Date:	31-Dec-2015
Status of Contracting:	10% of the items are contracted
Construction scheduled to start:	23-Dec-2018

Project Region: Asia

Estimated Project Cost:	1.67 B CNY
Estimated Construction Time:	7 years
Type of Equipment to be Purchased:	Power supply for fast ramping rate magnets, magnetic alloy loaded cavity, High intensity beam diagnosis devices, Vacuum system devices, Superconducting RF cavity, Electric device and control card

Project Leader(s):	Guoqing Xiao
Affiliation:	Institute of Modern Physics, Chinese Academy of Sciences
e-mail:	xiaogq@impcas.ac.cn

Contact Person(s):	Jiancheng Yang
Affiliation:	Institute of Modern Physics, Chinese Academy of Sciences
e-mail:	yangjch@impcas.ac.cn

Project Region: Asia

## IFMIF-A-FNS

\*No update provided in 2019

Project Location:	Japan
Project Type:	New Project
Project Description:	14 MeV neutron source for Nuclear Fusion materials research
Requirements List Available:	No
Approval Date:	
Status of Contracting:	Not ready for procurement
Construction scheduled to start:	
Estimated Project Cost:	
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	The accelerator will be a 125 mA CW 40 MeV deuterons superconducting Linac

Project Leader(s):	Keishi Sakamoto
Affiliation:	QST
e-mail:	Sakamoto.keishi@qst.go.jp

Contact Person(s):	Same as Project Leader(s)
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## Korea Heavy-Ion Medical Accelerator (KHIMA) project

Project Location:	Republic of Korea
Project Type:	New Project
Project Description:	Original R&D project was changed to turn-key based one for heavy ion therapy in Korea, where Seoul National University Hospital took over the project in 2017 from KIRAMS.
Requirements List Available:	Yes
Approval Date:	01-Apr-2010
Status of Contracting:	Building construction is done. System contraction will be made around June, 2019 based on total solution handover.
Construction scheduled to start:	01-July-2019
Estimated Project Cost:	250 M USD
Estimated Construction Duration:	5 years
Type of Equipment to be Purchased:	ECRIS for carbon beam, RFQ+DTL, HI synchrotron, HEBT, scanning irradiation system, accelerator control system, rotating gantry and other treatment system
Project Leader(s):	Hong Gyun Wu
Affiliation:	Department fo Radiation Oncology, Seoul Nat'l University Hospital
e-mail:	wuhg@snu.ac.kr

Project Region: Asia

Contact Person(s):	Jong Min Park
Affiliation:	Department fo Radiation Oncology, Seoul Nat'l University Hospital
e-mail:	leodavinci@naver.com



**RAON**

Project Location:	Republic of Korea
Project Type:	New Project
Project Description:	Rare isotope and stable ion beam facility with 400-kW, 200-MeV/u (for uranium beam) driver linac and 70-MeV proton cyclotron as ISOL driver.
Requirements List Available:	Yes
Approval Date:	20-Dec-2011
Status of Contracting:	Contracting
Construction scheduled to start:	20-Dec-2011
Estimated Project Cost:	946 M USD (excluding site cost)
Estimated Construction Time:	10 years
Type of Equipment to be Purchased:	SC cavities, cryomodules, SC magnets (HTS, LTS), 28 GHz ECR ion source, RFQ, solid state RF amplifiers, vacuum systems, control system

Project Leader(s):	Myeun Kwon
Affiliation:	Institute for Basic Science
e-mail:	kwonm@ibs.re.kr

Contact Person(s):	Dong-O Jeon
Affiliation:	Institute for Basic Science
e-mail:	jeond@ibs.re.kr

## RIBF upgrade project

Project Location:	Japan
Project Type:	Upgrade
Project Description:	This project aims at increasing the intensity of the radioactive isotope beams by 30 times more than what is available now at RIKEN RI Beam Factory (RIBF).
Requirements List Available:	No
Approval Date:	
Status of Contracting:	
Construction scheduled to start:	
Estimated Project Cost:	10,000M YEN
Estimated Construction Time:	7 years
Type of Equipment to be Purchased:	Beam line magnets, rf system, vacuum system, and high-power beam dump

Project Leader(s):	Hideto EN'YO
Affiliation:	RIKEN Nishina Center
e-mail:	enyo@riken.jp

Contact Person(s):	Osamu KAMIGAITO
Affiliation:	RIKEN Nishina Center
e-mail:	kamigait@riken.jp

Project Region: Asia

## R&D on High Energy Photon Source (HEPS-TF)

\*No update provided in 2019

Project Location:	People's Republic of China
Project Type:	New Project
Project Description:	In construction
Requirements List Available:	No
Approval Date:	12-Feb-15
Status of Contracting:	
Construction scheduled to start:	11-Apr-16
Estimated Project Cost:	50 M USD
Estimated Construction Time:	3 years
Type of Equipment to be Purchased:	Magnets, power supplies, kicker, BPM, KB mirror, insertion device, beam line optics, etc.

Project Leader(s):	Qing Qin
Affiliation:	IHEP
e-mail:	qinq@ihep.ac.cn

Contact Person(s):	Ning Zhao
Affiliation:	IHEP
e-mail:	zhaoning@ihep.ac.cn

## SPring-8 Upgrade (SPring-8-II)

Project Location:	Japan
Project Type:	Project Upgrade
Project Description:	The project aims at upgrading the current SPring-8 to a stable highly coherence ring-based source with an emittance of $\sim 100$ pm.rad, a stored current of 100~200 mA, and a beam lifetime of around 10 hours by timeshare use of the SACLAL linac as the ring injector.
Requirements List Available:	No
Approval Date:	
Status of Contracting:	Not ready for procurement
Construction scheduled to start:	
Estimated Project Cost:	
Estimated Construction Time:	5 years
Type of Equipment to be Purchased:	magnet system vacuum system beam diagnostic system LLRF and timing system control system

Project Leader(s):	Hitoshi Tanaka
Affiliation:	SPring-8
e-mail:	tanaka@spring8.or.jp

Contact Person(s):	Tetsuya Ishikawa
Affiliation:	SPring-8
e-mail:	ishikawa@spring8.or.jp

## Third RF system for storage ring of Taiwan Photon Source

Project Location:	Taiwan
Project Type:	Upgrade
Project Description:	Construct 3rd RF system including SRF cavity, transmitter and LLRF to support more beam line operation under 500mA beam current
Requirements List Available:	Yes
Approval Date:	01-Jan-2018
Status of Contracting:	Ongoing
Construction scheduled to start:	01-Jan-2018
Estimated Project Cost:	5 M USD
Estimated Construction Time:	5 years
Type of Equipment to be Purchased:	500MHz SRF cavity module, 500MHz 300kW solid-state transmitter, circulator, ferrite load, DLLRF system, vacuum components etc.

Project Leader(s):	Mei-Hsia Chang
Affiliation:	NSRRC
e-mail:	mhchang@nsrrc.org.tw

Contact Person(s):	Same as Project Leader(s)
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# Project Region: Europe

## AWAKE

\*No update provided in 2019

Project Location:	Switzerland
Project Type:	New Project
Project Description:	<p>Proton Driven Plasma Wakefield Experiment at CERN</p> <p>In Run 1, Phase 1 of AWAKE was dedicated to the study of the seeded self-modulation (SSM) that makes the long proton bunch suitable to drive large amplitude wakefields. The current Phase 2 is dedicated to acceleration of externally injected electrons. At the same time, we are developing plans for Run 2, scheduled to start in 2021. Run 2 will be dedicated to accelerating an externally injected bunch of electron and to the preservation of its quality: low relative energy spread and low emittance. These experiments will require a new plasma source and electron injector. We are also developing plans for the mid-term with applications to beam dump experiments at the ~100GeV level. Long term plans include very high energy collisions between TeV electrons and LHC protons. These applications will require very long plasma sources (50m to a few kilometers), with very uniform densities, These are both scientific and technical challenges.</p>

Project Region: Europe

Requirements List Available:	No
Approval Date:	28-Aug-13
Status of Contracting:	
Construction scheduled to start:	1-Sep-13
Estimated Project Cost:	20 M CHF (material)
Estimated Construction Time:	4 years
Type of Equipment to be Purchased:	Equipment that was purchased includes, TW laser system, alkali metal vapor source, streak camera, instrumentation (computers, oscilloscopes, microwave equipment, etc.), magnets, power converters, etc.

Project Leader(s):	Edda Gschwendtner
Affiliation:	CERN
e-mail:	edda.gschwendtner@cern.ch

Contact Person(s):	Patric Muggli (Physics Coordinator) Allen Caldwell (Collaboration Spokesperson)
Affiliation:	MPP, Munich
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## bERLinPro

Project Location:	Germany
Project Type:	New Project
Project Description:	SRF Photo-Injector with SRF based Energy Recovery Linac as test and demonstration facility, to explore the technology, beam physics and suitability low emittance, short pulse applications. Energy range: Gun 2 MeV, Booster $\Delta E = 4$ MeV (total energy = 6 MeV), Linac $\Delta E = 30$ MeV (total energy = 44 MeV). Current range: up to 5mA at start of operation. Available for beam and component tests within SupraLab@HZB.
Requirements List Available:	No.
Approval Date:	31-Oct-2010
Status of Contracting:	> 90% of the items are contracted
Construction scheduled to start:	01-Dec-2016 (following building construction)
Estimated Project Cost:	40 MEUR (including building, plus costs for personnel)
Estimated Construction Time:	5 years
Type of Equipment to be Purchased:	SRF Accelerating Cavities (1.3 GHz, 1.6 cell Gun, 2 cell Booster, 7 cell Linac), RF power sources (klystrons and SSA), "particulate free" AL vacuum systems, partially NEG coated, Cryogenic plant and distribution, diagnostic components including scopes and cameras



Project Region: Europe

Project Leader(s):	Andreas Jankowiak, Jens Knobloch
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Contact Person(s):	Same as Project Leader(s)
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## BESSY VSR

Project Location:	Germany
Project Type:	Upgrade
Project Description:	<p>The Helmholtz-Zentrum Berlin GmbH (HZB) is realizing an innovative upgrade scheme for their third Generation synchrotron light source BESSY II to generate simultaneously 15 ps and 1.7 ps (rms) long electron bunches, the Variable pulse length Storage Ring BESSY VSR. Light pulses of both the short and long pulses can be supplied to all beam ports and can be separated by pulse picking methods. With picosecond X-ray pulses of 1.25 MHz to 250 MHz repetition rate BESSY VSR covers the gap in pulse length between extreme brilliant pulses of diffraction limited storage rings and ultrashort pulses of Free Electron Lasers. Bunch shortening is achieved by enhanced longitudinal focusing with superconducting RF (SRF) cavities, approximately 80 times higher than in the present configuration. Alternating short and long buckets (400 in total) are generated by an RF beating scheme that employs a combination of 1.5 GHz and 1.75 GHz cavities operating at the 3rd and 3.5th harmonic of the fundamental, normal-conducting RF system. One cryo-module incorporating four SRF 4-cell cavities, two at each frequency, will be installed. The current in these buckets is defined by machine requirements and user demands.</p>
Requirements List Available:	No. Follow our regular tenders announced on <a href="http://www.service.bund.de">www.service.bund.de</a>

Project Region: Europe

Approval Date:	01-June-2016
Status of Contracting:	40% of the items are contracted.
Construction scheduled to start:	01-Dec-2019
Estimated Project Cost:	30 M EUR
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	HOM damped, high-voltage cw SRF cavities @ 1.5 GHz and 1.75 GHz, cryo-modules, particle free vacuum components, diagnostic components

Project Leader(s):	Pierre Schnizer, Andreas Jankowiak, Jens Knobloch
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Contact Person(s):	Same as Project Leader(s)
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## CLARA

Project Location:	United Kingdom
Project Type:	New Project
Project Description:	Single pass FEL, 250MeV, 100nm, test facility
Requirements List Available:	No
Approval Date:	1-Sep-14
Status of Contracting:	In Progress
Construction scheduled to start:	1-Apr-15
Estimated Project Cost:	35 M GBP
Estimated Construction Time:	5 years
Type of Equipment to be Purchased:	RF, vacuum, magnets, undulators, lasers, diagnostics, power supplies, controls

Project Leader(s):	Jim Clarke
Affiliation:	STFC
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Contact Person(s):	Same as Project Leader(s)
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## ELENA

Project Location:	Switzerland
Project Type:	New Project
Project Description:	ELENA is a small 30.4 m circumference, which has been constructed at CERN to decelerate antiprotons from 5.3 MeV to 100 keV to increase the efficiency, with which typical experiments operating traps can capture the beam. The machine is equipped with an electron cooler to limit deceleration losses and generate high brightness bunches delivered to the experiments. The ELENA ring has already been commissioned and provided beam to an experiment a new experimental zone. The installation and commissioning of electro-static transfer lines to experiments in an old zone takes place in 2019 and 2020.
Requirements List Available:	No
Approval Date:	2011
Status of Contracting:	Almost all equipment has been purchased and delivered.
Construction start:	~2014
Estimated Project Cost:	25 M CHF
Type of Equipment to be Purchased:	Almost all equipment required purchased and either installed or available.
Project Leader(s):	Christian Carli
Affiliation:	CERN
e-mail:	Christian.Carli@cern.ch
Contact Person(s):	Same as Project Leader(s)

## ELIMED

Project Location:	Italy
Project Type:	New Project
Project Description:	Realization of a transport beamline for laser-driven ions for multidisciplinary applications. The project will be concluded at the end of 2020 with the first radiobiological and dosimetry measurement.
Requirements List Available:	
Approval Date:	4-Dec-14
Status of Contracting:	on-time
Construction scheduled to start:	4-Dec-14
Estimated Project Cost:	2.5 M EUR
Estimated Construction Time:	Three years
Type of Equipment to be Purchased:	Conventional and non-conventional beam transport elements

Project Leader(s):	G A Pablo Cirrone
Affiliation:	INFN
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Contact Person(s):	Same as Project Leader(s)
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Project Region: Europe

## ELI-NP Gamma Beam System

\*No update provided in 2019

Project Location:	Romania
Project Type:	New Project
Project Description:	The system is dedicated to the development and operation of a high flux, high brilliance, monochromatic (bandwidth less than 0.5%), energy tuneable (continuously in the range of 0.2 - 19.5 MeV), linearly polarized (to more than 95%) gamma beam based on laser inverse Compton scattering off relativistic electron bunches.
Requirements List Available:	Yes
Approval Date:	18-Sep-12
Status of Contracting:	Completed Stage I of the contract consisting of the delivery of system components corresponding to a gamma beam energy of minimum 1 MeV
Construction scheduled to start:	19-Mar-14
Estimated Project Cost:	66.8 M EUR
Estimated Construction Time:	54 months
Type of Equipment to be Purchased:	Electron RF Linac 720 MeV, 1 Photoinjector laser, 2 Lasers of 200 mJ for inverse Compton scattering, interaction chambers with laser pulse circulators, electron and gamma beam diagnostics, control system.
Project Leader(s):	Nicolae Victor Zamfir
Affiliation:	IFIN-HH/ELI-NP

Project Region: Europe

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Contact Person(s):	Calin Alexandru Ur
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Project Region: Europe

## ESS Bilbao

\*No update provided in 2019

Project Location:	Spain
Project Type:	New Project
Project Description:	Partner (5%) of European Spallation Source ERIC (Lund, Sweden). Scientific and technical research for development, manufacturing, delivery and installation of the subsystems led by ESS-Bilbao in the ESS project.
Requirements List Available:	Yes
Approval Date:	01-Jun-14
Status of Contracting:	Subsystems: prototyping, and tendering, and some, awarded
Construction scheduled to start:	01-Jun-14
Estimated Project Cost:	92.1 M EUR: 73.7 M EUR In-Kind, 18.4 M EUR Cash
Estimated Construction Time:	Construction Phase: 2014-2020; Commissioning & Completion Phase: 2019-2025
Type of Equipment to be Purchased:	Equipment to manufacture: MEBT (Beam Instrumentation, Control Systems, Interlocks, Scrapers, Quadrupoles, Power supplies, Bunchers, RF power amplifiers, distribution, LLRF, Coupler, Fast Chopper); RF Systems (HPVC, HPA, distribution, Control and Interlocks, LLRF); Target Wheel, Monolith Vessel, Tuning Beam Dump, Proton Beam Window, Proton Beam Instrumentation Plug; Backscattering

Project Leader(s):	José L. Martinez
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Project Region: Europe

Affiliation:	ESS-Bilbao
e-mail:	jlmartinez@essbilbao.org
Contact Person(s):	Same as Project Leader(s)

## European Spallation Source (ESS)

Project Location:	Sweden
Project Type:	New project
Project Description:	The European Spallation Source (ESS) is a multi-disciplinary research facility based on the world's most powerful neutron source. The unique capabilities of this new facility will both greatly exceed and complement those of today's leading neutron sources, enabling new opportunities for researchers across the spectrum of scientific discovery, including life sciences, energy, environmental technology, cultural heritage and fundamental physics.
Requirements List Available:	Yes
Approval Date:	1-June-2014
Status of Contracting:	85% of accelerator items are contracted (in early 2019)
Construction scheduled to start:	1-June-2014
Estimated Project Cost:	1.84 B EUR (2013)
Estimated Construction Time:	Construction phase 2013-2025, Initial Operations phase 2019-2025, Steady State Operations phase 2026-2065, Decommissioning 2066
Type of Equipment to be Purchased:	RF modulators, RF power sources, RF accelerating cavities (normal and super-conducting), cryogenics and cryodistribution systems, vacuum equipment, magnets, power supplies, beam diagnostics, other accelerator related hardware equipment, detectors, motion controls, various services

Project Region: Europe

	related to installation, tooling, lifting, workshops
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Project Leader(s):	John Womersley (Director General), John Haines (Project Manager), Meredith Shirey (Head of Supply, Procurement and Logistics Division)
Affiliation:	European Spallation Source
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Contact Person(s):	Same as Project Leader(s)
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## Facility for Antiproton and Ion Research (FAIR)

\*No update provided in 2019

Project Location:	Germany
Project Type:	New Project
Project Description:	The Facility for Antiproton and Ion Research (FAIR) is an international accelerator facility under construction which will use antiprotons and ions to perform research in the fields of: nuclear, hadron and particle physics, atomic and anti-matter physics, high density plasma physics, and applications in condensed matter physics, biology and the bio-medical sciences
Requirements List Available:	
Approval Date:	
Status of Contracting:	
Construction scheduled to start:	2017
Estimated Project Cost:	
Estimated Construction Time:	2015
Type of Equipment to be Purchased:	fast ramping superconducting magnets for SIS100 synchrotron large aperture superconducting magnets for Super-FRS fragment separator
Project Leader(s):	Jörg Blaurock
Affiliation:	GSI
e-mail:	j.blaurock@gsi.de

Project Region: Europe

Contact Person(s):	Ingo Peter
Affiliation:	GSI
e-mail:	i.peter@gsi.de

## Future Circular Collider (FCC) study

Project Location:	Switzerland and France
Project Type:	New Project
Project Description:	<p>Future Circular Collider design study of a large-scale research infrastructure that can be realized in two consecutive steps:</p> <ul style="list-style-type: none"> <li>- Stage 1: Highest luminosity energy-frontier circular electron-positron collider (FCC-ee) with a circumference of about 100 kilometer for precision studies of Z, W and Higgs bosons, and the top quark.</li> <li>- Stage 2: Energy-frontier hadron collider (FCC-hh), housed in the same tunnel, with a proton-proton collision energy of 100 TeV and a corresponding energy in heavy-ion collisions.</li> </ul>
Requirements List Available:	No
Approval Date:	01-Mar-2026 (expected)
Status of Contracting:	0% of the items are contracted, R&D phase
Construction scheduled to start:	01-Mar-2028 (expected)
Estimated Project Cost:	10 BEURO for stage 1
Estimated Construction Duration:	10 years for stage 1
Type of Equipment to be Purchased:	Stage 1: SRF cavities at 400 and 800 MHz, efficient RF power sources, vacuum

Project Region: Europe

	chambers appropriate for high synchrotron radiation, low-field iron dominated accelerator magnets, beam diagnostics equipment. Stage 2: Nb3Sn accelerator magnets with a field of about 16 T, advanced cryogenics, novel manufacturing techniques, collimation system, etc.
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Project Leader(s):	Michael Benedikt
Affiliation:	CERN
e-mail:	michael.benedikt@cern.ch

Contact Person(s):	Same as project leader
Affiliation:	
e-mail:	



## FLUTE

Project Location:	Germany
Project Type:	New Project
Project Description:	FLUTE (Ferninfrarot Linac Und Test Experiment) is a compact versatile linear accelerator R&D facility currently under construction at KIT. FLUTE allows conducting a variety of accelerator physics studies and it will be used to generate intense, ultra-short THz pulses for photon science experiments. FLUTE consists of a ~ 7 MeV photo-injector gun, a ~ 41 MeV S-band linac and a D-shaped chicane to compress bunches to a few femto-seconds and will provide a THz beamline for different applications. In addition access to FLUTE experiments at 7 and 41 MeV will be possible via the ARIES transnational access program.
Requirements List Available:	
Approval Date:	
Status of Contracting:	50% ongoing, 50% planned for tendering
Construction scheduled to start:	started
Estimated Project Cost:	4 M EUR investment plus costs for personal, building, expendables, operation
Estimated Construction Time:	2020
Type of Equipment to be Purchased:	High stability power supplies, magnets, electron and photon diagnostics, vacuum components in 316 LN, OFHC copper,

Project Region: Europe

	Modulator for 45MW klystron, Solid State Amplifier, MTCA timing system components
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Project Leader(s):	Dr.-Ing. R. Ruprecht
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Contact Person(s):	Dr.-Ing. R. Ruprecht Dr. M. Schuh Dr. A. Bernhard
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## High Luminosity LHC (also: HiLumi LHC, HL-LHC)

Project Location:	Switzerland
Project Type:	Project Upgrade
Project Description:	<a href="https://edms.cern.ch/ui/file/1723389/1/HL-LHC_in_a_nutshell.pdf">https://edms.cern.ch/ui/file/1723389/1/HL-LHC_in_a_nutshell.pdf</a>  <a href="https://project-hl-lhc-industry.web.cern.ch/">https://project-hl-lhc-industry.web.cern.ch/</a>
Requirements List Available:	Yes
Approval Date:	1-Nov-13
Status of Contracting:	Tendering components
Construction scheduled to start:	1-Jan-16
Estimated Project Cost:	950 M CHF (material cost) including R&D and in-kind contribution; Industrial contracts are about 500 M CHF
Estimated Construction Time:	Up to mid 2026
Type of Equipment to be Purchased:	SC Magnets & components; SC RF cavities & components; Powering and controls devices for Magnets and Cavities; Collimators & precision mechanics special equipment; Vacuum equipment and beam diagnostics; Cryogenic plants and cryogenic equipment; SC links in MgB2 or High temperature superconductors; Large & precision mechanical tools; technical infrastructures, manufacturing services.
Project Leader(s):	Lucio Rossi
Affiliation:	CERN

Project Region: Europe

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Contact Person(s):	Isabel Bejar Alonso
Affiliation:	CERN
e-mail:	Isabel.Bejaralonso@cern.ch

Project Region: Europe

## IFMIF-DONES

Project Location:	Europe- Granada (Spain)
Project Type:	New Project
Project Description:	A fusion-like (deuteron beam on Li target) neutron source for nuclear fusion materials research
Requirements List Available:	Engineering design available
Approval Date:	2020-2021
Status of Contracting:	Not yet started. Only engineering work under development
Construction scheduled to start:	2020
Estimated Project Cost:	600 M€
Estimated Construction Time:	8 years
Type of Equipment to be Purchased:	The accelerator will be a 125 mA CW 40 MeV deuterons superconducting linac

Project Leader(s):	Angel Ibarra (for engineering work up to 2020)
Affiliation:	CIEMAT
e-mail:	Angel.ibarra@ciemat.es

Contact Person(s):	Same as Project Leader(s)
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## Iranian Light Source Facility (ILSF)

Project Location:	Iran
Project Type:	New Project
Project Description:	<p>The Iranian Light Source Facility (ILSF) is a 3rd generation light source located near the city of Qazvin in Iran. With energy of 3GeV (full energy injection) and a 150MeV linac as pre-injector, the ILSF project is aimed to be a competitive light source for the Middle East and beyond. The stored beam current in top up mode will be 250mA at the first phase of operation, and the average pressure of vacuum chamber is approximately 1 nTorr. Some prototype components such as high power solid-state radio frequency amplifiers, LLRF system, thermionic RF gun, storage ring H-type dipole and quadruple magnets, Hall probe system for magnetic measurement and highly stable magnet power supplies is under construction in ILSF R&amp;D laboratory.</p> <p>The project is currently in R&amp;D (Finalizing the Basic Design) stage while the R&amp;D Labs, Administration Building, Guesthouse and Infrastructures are under construction.</p>
Requirements List Available:	No
Approval Date:	01-Oct-2010
Status of Contracting:	Partially Funded by the Government, Financing (negotiations in progress)
Construction scheduled to start:	May 2018
Estimated Project Cost:	300M USD

Project Region: Europe

Estimated Construction Time:	10 years (2018-2028)
Type of Equipment to be Purchased:	Turnkey 150MeV Linac, Insertion Devices, RF systems (Solid State Amplifiers, Klystron, Cavities), Power supplies for Magnets, Vacuums systems (ion pumps, NEG Pumps, Vacuum Chambers, Vacuum Gates & Valves etc.), Beam Optics & (Beamline Components, X-Ray Detectors, X-ray Optics), Beam Diagnostic Devices

Project Leader(s):	Javad Rahighi
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## LHC Injectors Upgrade (LIU)

Project Location:	Switzerland
Project Type:	Project Upgrade
Project Description:	LHC Injectors Upgrade
Requirements List Available:	Yes
Approval Date:	1-Oct-10
Status of Contracting:	
Construction scheduled to start:	
Estimated Project Cost:	200 M CHF
Estimated Construction Time:	11 years
Type of Equipment to be Purchased:	Many accelerator equipment

Project Leader(s):	Malika Meddahi
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Contact Person(s):	Same as Project Leader(s)
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## MESA - Mainz Energy-recovering Superconducting Accelerator

Project Location:	Germany
Project Type:	New Project
Project Description:	Recirculating superconducting linear accelerator with option for external beam and for energy recovery operation
Requirements List Available:	No
Approval Date:	01-NOV-2012
Status of Contracting:	cryomodules ordered, RF system under contracting, magnets, subsystems: purchase not started
Construction scheduled to start:	01-JUN-2015
Estimated Project Cost:	15 M EUR
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	superconducting RF system, recirculators, normal conducting injector, infrastructure: vacuum powersupplies, shelding

Project Leader(s):	Kurt Aulenbacher
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Contact Person(s):	Same as Project Leader(s)
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Project Region: Europe

## MYRRHA\_100MeV

\*No update provided in 2019

Project Location:	Belgium
Project Type:	New Project
Project Description:	First phase of the full-size MYRRHA project, an Accelerator Driven System fed by a 600 MeV 4 mA CW proton linac.
Requirements List Available:	No
Approval Date:	1-Jan-18
Status of Contracting:	Present phase is prototyping. Contracting status is "prospecting".
Construction scheduled to start:	1-Jan-18
Estimated Project Cost:	320 M EUR
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	100 MeV proton linac consisting of a 17 MeV injector with 15 copper CH-cavities followed by a superconducting spoke linac with 48 single spoke cavities. A target station is foreseen.

Project Leader(s):	Hamid Aït Abderrahim
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## Nuclotron-based Ion Collider facility (NICA)

\*No update provided in 2019

Project Location:	Russia
Project Type:	New Project
Project Description:	NICA heavy ion collider has the aim to create a special state of matter in which our Universe stayed shortly after the Big Bang - the Quark-Gluon Plasma (QGP).
Requirements List Available:	No
Approval Date:	11-Jan-11
Status of Contracting:	collider building construction, superconducting magnets production
Construction scheduled to start:	1-Sep-15
Estimated Project Cost:	500 M USD
Estimated Construction Time:	5 years
Type of Equipment to be Purchased:	Heavy ion linear accelerator, booster synchrotron, collider rings, multi-purpose detector, high energy electron cooling system.

Project Leader(s):	Grigory Trubnikov, Igor Meshkov
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Contact Person(s):	Same as Project Leader(s)
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## SINBAD

Project Location:	Germany
Project Type:	
Project Description:	<p>The SINBAD facility is a dedicated accelerator R&amp;D facility currently under construction at DESY Hamburg. Located in the former DORIS accelerator tunnel (plus associated halls), it features sufficient space to host multiple independent experiments. In the initial stage, two experiments, AXSIS and ARES, will be implemented. The AXSIS - collaboration aims for acceleration of electrons to 10MeV in THz-laser driven dielectric loaded waveguides. At ARES a normal conducting S-band linac will accelerate ultra-short electron bunches (single/sub fs) to 100MeV with excellent beam arrival time stability. Currently the first stage – the RF-gun – is being commissioned. Once fully operational, the linac will be used to a) compare various bunch compression methods and b) to inject into advanced acceleration schemes like dielectric structures (e.g. ACHIP collaboration experiments). The facility will be continuously expanded in the next years to e.g. include X-band transverse deflecting structures and a high power laser lab for laser plasma wakefield acceleration.</p>
Requirements List Available:	Yes
Approval Date:	20-Sep-16
Status of Contracting:	50% of the items are contracted

Project Region: Europe

1-Jan-2017	
Estimated Project Cost:	40ME
Estimated Construction Time:	6
Type of Equipment to be Purchased:	Electron linac equipment, X-band RF, high power laser components

Project Leader(s):	Ulrich Dorda
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## SPARC\_LAB

\*No update provided in 2019

Project Location:	Italy
Project Type:	Project Upgrade
Project Description:	<p>The SPARC_LAB test facility at LNF is an inter-disciplinary laboratory with unique features in the world. Born from the integration of a last generation photo-injector, able to produce electron beams up to 200 MeV energy with high peak current (&gt; 1 kA) and low emittance (&lt;2 mm-mrad), and of a high power laser (&gt; 200 TW), able to produce ultra-short pulses (&lt;30 fs), SPARC_LAB has already enabled the development of innovative radiation sources and the test of new techniques for particle acceleration using lasers. In particular a Free Electron Laser has been commissioned (coherent radiation tunable from 500 nm down to 40 nm in new regimes of operation has been observed), a source of both broad band and narrow band (&lt;30%) and high energy (&gt; 10 eV) THz radiation has been tested and electrons have been accelerated up to 100 MeV in 4 mm long plasma wave excited by the high power laser FLAME. Beam driven plasma acceleration experiments are also foreseen and the beam line is under commissioning. An experiment of light ions acceleration through laser interaction with thin metal targets is also underway. SPARC_LAB is also an accelerator test facility in the framework of the</p>

Project Region: Europe

	European collaborations ELI, EUROFEL and EUPRAXIA.
Requirements List Available:	No
Approval Date:	11-Feb-12
Status of Contracting:	In progress for upgrades
Upgrade scheduled to start:	1-Jan-17
Estimated Project Cost:	3 M EUR
Estimated Construction Time:	3 years
Type of Equipment to be Purchased:	Accelerating structures, RF components, Undulators, Quadrupole Magnets, Vacuum components, Control system, Lasers, Optics components, UV and X ray detector.

Project Leader(s):	Massimo Ferrario
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Contact Person(s):	Same as Project Leader(s)
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**SPES**

Project Location:	Italy
Project Type:	New Project
Project Description:	ISOL type facility for the acceleration of exotic beams. A primary p-beam is accelerated to 40 MeV by a commercial cyclotron onto a Target-Ion-Source system. Emitted charged ions are mass-selected with high-resolution, sent to an ECR-type charge breeder and accelerated through the existing SC linac ALPI. The cyclotron will be used also for production and research in the field of radioisotopes for medicine.
Requirements List Available:	No
Approval Date:	15-Dec-2012
Status of Contracting:	75% of the items are contracted
Construction scheduled to start:	15_Dec-2012
Estimated Project Cost:	56 M€
Estimated Construction Time:	8 years
Type of Equipment to be Purchased:	Beam Dipoles and lenses. Vacuum components, pumps and gauges. Beam Instrumentation devices. Control systems. Cryomodules. New cryogenic distribution system. RF components and instruments. HV platform. Mechanical components on design specs. Remote handling devices. Hot cells.



Project Region: Europe

Project Leader(s):	Gianfranco Prete
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Project Region: Europe

## Super Charm-Tau Factory

\*No update provided in 2019

Project Location:	Russia
Project Type:	New Project
Project Description:	e+e- collider with the beam energy from 1 GeV to 2.5 GeV and with Crab Waist collision scheme providing $1e35 \text{ cm}^{-2}\text{s}^{-1}$ maximum luminosity.
Requirements List Available:	No
Approval Date:	
Status of Contracting:	
Construction scheduled to start:	
Estimated Project Cost:	450 M EUR
Estimated Construction Time:	5 years
Type of Equipment to be Purchased:	Detector systems, electronics, beam diagnostics, feedback systems, vacuum equipment, control system.

Project Leader(s):	Eugene Levichev
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Contact Person(s):	Same as Project Leader(s)
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## Upgrade of the INFN-LNS Superconducting Cyclotron and relative beam lines

Project Location:	Italy
Project Type:	Upgrade
Project Description:	The proposed upgrade of the INFN-LNS Superconducting Cyclotron aims at increasing the intensity of ion beams with mass lower than 40 amu. A beam power of 10 kW will be reached by means of extraction by stripping, so as to fulfil the demand of users willing to study rare processes in Nuclear Physics. New beam lines will be installed in order to produce intense in-flight radioactive beams with the new fragment separator FRAISE, and to upgrade the magnetic spectrometer MAGNEX
Requirements List Available:	Yes
Approval Date:	March 2019
Status of Contracting:	6% of the items are contracted
Construction scheduled to start:	2019
Estimated Project Cost:	19.3 M EURO
Estimated Construction Time:	3 years
Type of Equipment to be Purchased:	Superconducting Magnet, Magnetic channels, RF liner, RF dees, Stripper system, Power supplies, Beam line elements, Diagnostic equipment, Radiation monitor

Project Region: Europe

Project Leader(s):	Danilo Rifuggiato
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Contact Person(s):	Same as Project Leader(s)
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## ThomX

Project Location:	FRANCE ( Orsay)
Project Type:	New Project
Project Description:	Compact X-ray source based on Compton back-scattering. ThomX is designed to maximize the average X-ray flux and be a compact, tunable and reliable source which can be operated in hospitals, museums or universities.
Requirements List Available:	no
Approval Date:	20/01/12
Status of Contracting:	done
Construction scheduled to start:	01/01/2016
Estimated Project Cost:	10 M EURO
Estimated Construction Time:	4 years
Type of Equipment to be Purchased:	Vacuum components, RF-equipment, modulator, klystrons, magnets, pulsed magnets, laser,...

Project Leader(s):	Hugues Monard
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Project Region: Europe