THE 11th INTERNATIONAL
PARTICLE
ACCELERATOR
CONFERENCE

PARTICLE ACCELERATOR PROJECTS AND UPGRADES

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PARTICLE ACCELERATOR PROJECTS AND UPGRADES

For Industry Collaboration in the Field of Particle Accelerators

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12th 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.

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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Contents

Project Region: Americas

Advance Rare Isotope Facility (ARIEL-II)

Project Location:	Canada
Project Type:	Upgrade project
Project Description:	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 μA 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.
Requirements List Available:	Yes
Approval Date:	06-Oct-2016

Project Region: Americas

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
Project Leader(s):	Reiner Kruecken
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e-mail:	lax@triumf.ca

Advanced Photon Source Upgrade (APS)

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

Project Region: Americas

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
e-mail:	rhettel@anl.gov
Contact Person(s):	Same as Project Leader(s)

BELLA Second Beamline and High Intensity Interaction Point

Project Location:	United States of America
Project Type:	Accelerator Improvement Projects
Project Description:	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 pf 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.

Project Region: Americas

Requirements List Available:	Yes
Approval Date:	2018
Status of Contracting:	Major procurements in progress
Construction scheduled to start:	2019
Estimated Project Cost:	
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)
Affiliation:	LBNL
e-mail:	ehesarey@lbl.gov, cgrgeddes@lbl.gov
Contact Person(s):	Same as Project Leader(s)

Cornell-BNL ERL Test Accelerator (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:	Four turn ERL beam commissioning is ending at the end of December 2019
Construction scheduled to start:	01-Jan-2017
Estimated Project Cost:	25 M USD
Estimated Construction Time:	3.5 years

Project Region: Americas

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 Trbojevic
Affiliation:	Cornell and BNL (respectively)
e-mail:	Georg.hoffstaetter@cornell.edu, trbojevic@bnl.gov
Contact Person(s):	Same as Project Leader(s)

e-Relativistic Heavy Ion Collider (eRHIC)

Project Location:	United States of America
Project Type:	New Project
Project Description:	Electron-Ion Collider for luminosities of L = 10^{34} $cm^{-2}s^{-1}$, 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)
Affiliation:	Brookhaven National Laboratory, Upton, NY, USA (BNL)
e-mail:	willeke@bnl.gov
Contact Person(s):	Diane Hatton
Affiliation:	BNL
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Facility for Advanced Accelerator Experimental Tests II (FACET-II)

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
Affiliation:	SLAC National Laboratory
e-mail:	yakimenk@slac.stanford.edu
Contact Person(s):	Same as Project Leader(s)

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 Region: Americas

Project Leader(s):	Thomas Glasmacher
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Contact Person(s):	Jie Wei
Affiliation:	Michigan State University
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Integrable Optics Test Accelerator (IOTA)

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 Integrable Optics Test Accelerator (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

Project Region: Americas

	Advanced beam instrumentation
Project Leader(s):	Alexander Valishev
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Contact Person(s):	Vladimir Shiltsev
Affiliation:	Fermilab
e-mail:	shiltsev@fnal.gov

Linac Coherent Light Source II (LCLS 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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e-mail:	galayda@slac.stanford.edu
Contact Person(s):	Kelvin Tom

Affiliation:	SLAC National Accelerator Laboratory
e-mail:	ktom@slac.stanford.edu

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

Project Region: Americas

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
Affiliation:	Example: SLAC National Accelerator Laboratory
e-mail:	haysgr@slac.stanford.edu
Contact Person(s):	Laura Browne
Affiliation:	SLAC National Accelerator Laboratory
e-mail:	lnb@slac.stanford.edu

Long Baseline Neutrino Facility (LBNF) Beamline

Project Location:	United States of America
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:	Site preparation and conventional facilities engineering have started.
Construction scheduled to start:	01-Jan-2020
Estimated Project Cost:	
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	Magnets, power supplies, beam instrumentation, vacuum equipment and instrumentation, cooling

	plants, capacitor banks, beam windows, customized steel and polyethylene shielding, controls
Project Leader(s):	Christopher J. Mossey
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Contact Person(s):	Jonathan Lewis
Affiliation:	Fermilab
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Proton Improvement Plan-II (PIP-II)

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 enable world's most intense neutrino beam for LBNF/DUNE and support long-term research goals at Fermilab.
Requirements List Available:	Yes
Approval Date:	November 2015
Status of Contracting:	Preliminary Design Phase
Construction scheduled to start:	May 2020
Estimated Project Cost:	888 M USD
Estimated Construction Time:	7 years (CF), 8 years (entire project)
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 Merminga
Affiliation:	Fermilab
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Contact Person(s):	Same as Project Leader(s)

Proton Power Upgrade (PPU)

Project Location:	Spallation Neutron Source Oak Ridge National Laboratory, 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 2018 (CD-1)
Status of Contracting:	Long lead procurements underway for superconducting cavities, fundamental power couplers, cryomodules, RF systems, and klystron gallery infrastructure upgrades
Construction scheduled to start:	January-2020
Estimated Project Cost:	250 M USD
Estimated Construction Time:	4 years
Type of Equipment to be Purchased:	RF equipment (klystrons, transmitters, waveguide components, high voltage modulators, low-level RF control system), superconducting RF cryomodules, high power target and ancillary supporting equipment,

	magnets, klystron gallery infrastructure, construction of tunnel stub to facilitate beam transport to future 2nd target station
Project Leader(s):	John Galambos, project director
Affiliation:	SNS
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Contact Person(s):	Mark Champion, project manager
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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:	Accelerator under commissioning. First phase beamlines under construction and commissioning.
Construction scheduled to start:	01-Jul-2012
Estimated Project Cost:	420 M (USD) with 13 beamlines
Estimated Construction Duration:	7 years
Type of Equipment to be Purchased:	Future purchase process will be related to second phase beamlines (optics, vacuum, ID's, etc.)
Project Leader(s):	Antônio José Roque da Silva
Affiliation:	CNPEM (Brazilian Center for Reaserach in Energy and Materials)

e-mail:	jose.roque@cnpem.br
Contact Person(s):	Lucas Sanfelici
Affiliation:	LNLS/CNPEM (Brazilian Synchrotron Light Laboratory)
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SNS Second Target Station

Project Location:	United States of America
Project Type:	Upgrade
Project Description:	SNS will add a 700kW second target station to the neutron production facility .
Requirements List Available:	Yes (CDR format)
Approval Date:	Mission need approved in 2009
Status of Contracting:	0% of the items are contracted
Construction scheduled to start:	01-Aug-2023
Estimated Project Cost:	XX M (USD/EURO/YEN/CNY...)
Estimated Construction Duration:	5 years
Type of Equipment to be Purchased:	Vacuum components, beam diagnostics, magnets and power supplies, solid rotating target, neutron guides, choppers, and detectors etc.
Project Leader(s):	John Haines and Graeme Murdoch
Affiliation:	ORNL

e-mail:	murdochgr@ornl.gov
Contact Person(s):	Fulvia Pilat
Affiliation:	ORNL
e-mail:	pilatfc@ornl.gov

Canadian Light Source 2 (CLS2)

Project Location:	Canada
Project Type:	New Project
Project Description:	An IR FEL user facility is being planned for short pulse Infra Red science using IR photon beamlines
Requirements List Available:	no
Approval Date:	Funding decisions announced November 2020
Status of Contracting:	90% of the items are contracted
Construction scheduled to start:	Planned start of construction 2021
Estimated Project Cost:	42.5 M CAD
Estimated Construction Duration:	3 years
Type of Equipment to be Purchased:	Magnets, vacuum components, ~35 MEV electron linac, beam diagnostics, inserion devices, IR photon beamlines
Project Leader(s):	Scott Hopkins, Mark Boland
Affiliation:	University of Waterloo

e-mail:	
Contact Person(s):	Mark Boland
Affiliation:	CLS
e-mail:	mark.boland@lightsouce.ca

Resonant Soft X-ray ID Beamline at CLS

Project Location:	Canada
Project Type:	New Project
Project Description:	The last straight on the CLS storage ring is planned to be used for a new soft x-ray insertion device beamline.
Requirements List Available:	no
Approval Date:	Funding decisions announced November 2020
Status of Contracting:	90% of the items are contracted
Construction scheduled to start:	Planned start of construction 2021
Estimated Project Cost:	20 M CAD
Estimated Construction Duration:	3 years
Type of Equipment to be Purchased:	inserion device, soft x-ray endstation, monochomater, photon instrumentation and detectors.
Project Leader(s):	Mark Boland

Affiliation:	CLS
e-mail:	mark.boland@lightsouce.ca
Contact Person(s):	
Affiliation:	
e-mail:	

Multibend Achromat Storage Ring Light Source at CLS

Project Location:	Canada
Project Type:	New Project
Project Description:	A new multibend achromat storage ring light source is being planned and a CDR is under preparation. To achieve a 4th generation lightsource performance a new facility is required, the present tunnel is too small to upgrade.
Requirements List Available:	no
Approval Date:	Unfunded, approval expected by 2023
Status of Contracting:	90% of the items are contracted
Construction scheduled to start:	Unscheduled, possibly 2025 construction start
Estimated Project Cost:	1,000 M CAD
Estimated Construction Duration:	4 years
Type of Equipment to be Purchased:	Magnets, vacuum components, RF cavities and amplifiers, linear accelerator and possibly booster

	synchrotron, beam diagnostics, inserion devices, x-ray beamlines
Project Leader(s):	Mark Boland
Affiliation:	CLS
e-mail:	mark.boland@lightsouce.ca
Contact Person(s):	
Affiliation:	
e-mail:	

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 8 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:	120 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

Project Region: Asia

Affiliation:	ANSTO- Australian Synchrotron
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Contact Person(s):	Michelle Jones-Lennon
Affiliation:	ANSTO- Australian Synchrotron
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Australian Synchrotron Maintenance

Project Location:	Melbourne, 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
Affiliation:	ANSTO - Australian Synchrotron
e-mail:	deanm@ansto.gov.au
Contact Person(s):	Dr. Rohan Dowd
Affiliation:	ANSTO - Australian Synchrotron
e-mail:	rohand@ansto.gov.au

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:	8 years
Type of Equipment to be Purchased:	Competitive funds
Project Leader(s):	Akira Matsumura
Affiliation:	University of Tsukuba

Project Region: Asia

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Contact Person(s):	Hiroaki Kumada
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Project Region: Asia

China Spallation Neutron Source (CSNS)

Project Location:	Dongguan City, Guangdong Province,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, open to users
Construction scheduled to start:	20-Oct -2011
Estimated Project Cost:	1.86632 Billion CNY
Estimated Construction Duration:	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.

Project Region: Asia

Project Leader(s):	Hesheng Chen
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Contact Person(s):	Lijun Jiang
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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:	Finished, keep upgrading
Construction scheduled to start:	01-April-2011

Project Region: Asia

Estimated Project Cost:	300 M CNY
Estimated Construction Time:	6 years
Type of Equipment to be Purchased:	Low radiation beam dump of 200 kW for 10-MeV proton, beam loss monitors at low energy section, Low level RF and machine protection system based on FPGA
Project Leader(s):	Hushan Xu
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Contact Person(s):	Yuan He
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Chinese initiative Accelerator Driven System (CiADS)

Project Location:	People's Republic China
Project Type:	New Project
Project Description:	CiADS is a research facility of a megawatt-class accelerator-driven subcritical system to demonstrate the feasibility of ADS and the key technologies of the high power sc-linac, the high-power target, and the fast reactor. It consists of a continuous-wave superconducting proton LINAC with 500 MeV and 5 mA, a liquid LBE coolant 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. The superconducting solenoids are employed to focus beam in the cryomodules. The power supplies are modularization and can serve all the solenoids by in series or in parallel. The quench protection system is integrated in the digital controller. The prototypes of all the devices will be purchased in 2020.
Requirements List Available:	Yes

Approval Date:	30-Dec-2015
Status of Contracting:	Prototype purchasing and verification
Construction scheduled to start:	July-2019
Estimated Project Cost:	4.0 B CNY
Estimated Construction Time:	7 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
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Contact Person(s):	Yuan He
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High Intensity Heavy Ion Accelerator Facility (HIAF)

Project Location:	People's Republic of China
Project Type:	New Project
Project Description:	HIAF is a new accelerator facility under construction in China. The facility was designed to provide intense beams of primary and radioactive ions for a wide range of research fields. 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. HIAF also will provide high energetic highly bunched heavy ion beams for High Energy and Density Physics study.
Requirements List Available:	No
Approval Date:	31-Dec-2015
Status of Contracting:	Under progress
Construction scheduled to start:	31-Dec-2018
Estimated Project Cost:	$450 million currency

Estimated Construction Duration:	7 years
Type of Equipment to be Purchased:	Irradiation protection magnet, Power supply for fast ramping rate magnets, magnetic alloy loaded cavity, High intensity beam diagnosis devices, Vacuum system devices, Superconducting RF cavity, Power amplifiers, Feedback systems
Project Leader(s):	Guoqing Xiao
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Contact Person(s):	Jiancheng Yang
Affiliation:	Institute of Modern Physics, Chinese Academy of Sciences
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International Fusion Materials Irradiation Facility (IFMIF-A-FNS)

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)

Korea Heavy-Ion Medical Accelerator (KHIMA)

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 2019 from KIRAMS.
Requirements List Available:	Yes
Approval Date:	01-Apr-2010
Status of Contracting:	Building construction is done. System contraction will be made around April, 2020 based on total solution handover.
Construction scheduled to start:	01-July-2020
Estimated Project Cost:	250 M USD
Estimated Construction Time:	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 Region: Asia

Project Leader(s):	Hong-Gyun Wu
Affiliation:	Department of Radiation Oncology, Seoul Nat'l University Hospital
e-mail:	wuhg@snu.ac.kr
Contact Person(s):	Jong Min Park
Affiliation:	Department of Radiation Oncology, Seoul Nat'l University Hospital
e-mail:	leodavinci@naver.com

Rare isotope Accelerator complex for ON-line experiments (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 Location:	Japan
Project Type:	Upgrade
Project Description:	This project aims at increasing the intensity of the radioactive isotope beams by 20 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

Project Region: Asia

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

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 ~100 pm.rad, a stored current of 200 mA, and a beam lifetime of around 10 hours by timeshare use of the SACLA 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

Project Region: Asia

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:	7 M USD
Estimated Construction Time:	5 years
Type of Equipment to be Purchased:	500MHz kekb6TYPE SRF module,500MHz 320kW solid-state power amplifier, circulator, ferrite load, DLLRF system, vacuum components etc.
Project Leader(s):	Mei-Hsia Chang

Project Region: Asia

Affiliation:	NSRRC
e-mail:	mhchang@nsrrc.org.tw
Contact Person(s):	Same as Project Leader(s)

Shanghai Synchrotron Radiation Facility (SSRF) beam line

Project Location:	People's Republic of China
Project Type:	Upgrade
Project Description:	Construction 17 beam lines at SSRF. Also the storage ring will upgraded (2 cell lattice modified, a 3rd harmonic cavity installed, a backup cryogenic helium system built)
Requirements List Available:	
Approval Date:	Jan. 2016
Status of Contracting:	50% of the items are contracted
Construction scheduled to start:	
Estimated Project Cost:	1.6Billion CNY
Estimated Construction Duration:	6 years
Type of Equipment to be Purchased:	
Project Leader(s):	Zhentang Zhao

Project Region: Asia

Affiliation:	Shanghai advanced research institute. CAS
e-mail:	Zhaozhentang@sinap.ac.cn
Contact Person(s):	Fan ying
Affiliation:	Shanghai advanced research institute. CAS
e-mail:	fany@sinap.ac.cn

Circular Electron Positron Collider (CEPC)

Project Location:	People's Republic of China
Project Type:	New Project
Project Description:	Circular Electron Positron Collider (CEPC)
Requirements List Available:	no
Approval Date:	2023(expected)
Status of Contracting:	TDR phase with R&D activities, from 2019-2022
Construction scheduled to start:	2023 (expected)
Estimated Project Cost:	5 Billion (USD)
Estimated Construction Duration:	8 years
Type of Equipment to be Purchased:	Magnets, Vacuum components, RF-equipment, beam diagnostics, power sources, cryogenic system, SC cavities, cryomodules, S band Klystrons, accelerator tubes, modulators...
Project Leader(s):	Yifang WANG, Xinchou LOU, Jie GAO

Project Region: Asia

Affiliation:	IHEP, CAS
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Contact Person(s):	Jie GAO
Affiliation:	IHEP
e-mail:	gaoj@ihep.ac.cn

High Energy Light Source (HELS)

Project Location:	Beijing, People's Republic of China
Project Type:	New Project
Project Description:	High Energy Light Source
Requirements List Available:	no
Approval Date:	01-Aug-2050
Status of Contracting:	Just started
Construction scheduled to start:	June-2019
Estimated Project Cost:	5 Billion (CNY)
Estimated Construction Duration:	6 years
Type of Equipment to be Purchased:	Magntes, Vacuum components, RF-equipment, beam diagnostics, power sources, cryogenic system
Project Leader(s):	Qing Qin
Affiliation:	IHEP
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Contact Person(s):	Yi Jiao

Project Region: Asia

Affiliation:	IHEP
e-mail:	jiaoyi@ihep.ac.cn

Heavy Ion Linac Injector for Heavy Ion Research Facility in Lanzhou (HIRFL)

Project Location:	People's Republic of China
Project Type:	Upgrade
Project Description:	HIRFL, which consists of the Sector Focusing Cyclotron, the Separated Sector Cyclotron, the Cooler Storage Ring (CSR), produces medium and high-energy ion beams from proton to uranium. To further increase the performance of CSR to accelerate heavy ion beams, room temperature heavy ion linac injectors have been proposed and are now partly under construction.
Requirements List Available:	Yes
Approval Date:	01-Jan-2010
Status of Contracting:	50% of the items are contracted
Construction scheduled to start:	01-June-2018
Estimated Project Cost:	N/A

Estimated Construction Duration:	5 years
Type of Equipment to be Purchased:	vacuum components, RF-equipment, beam diagnostics, Nb_3Sn wire, cryogenic instruments, 4.2 K cryo-cooler, room temperature magnets, high current power supplies, high voltage power supplies, high purity copper, etc.
Project Leader(s):	Jiawen Xia
Affiliation:	Institute of Modern Physics, Chinese Academy of Sciences
e-mail:	xiajw@impcas.ac.cn
Contact Person(s):	Xuejun Yin
Affiliation:	Institute of Modern Physics, Chinese Academy of Sciences
e-mail:	yinxj@impcas.ac.cn

Low Energy Accelerator Facility (LEAF)

Project Location:	People's Republic of China
Project Type:	New Project
Project Description:	LEAF (Low Energy Accelerator Facility), is aiming to prototype the room temperature front end of High Intensity Heavy Ion Accelerator Facility (HIAF) and also serve as a stand-along facility for multi-discipline physics researches using high intensity low energy heavy ion beams, such as material irradiation research, low energy astro physics experiments, and so on. LEAF can accelerate high intensity ion beams of M/q=2~7 up to 0.7 MeV/u, typically >1 emA U^{34+}. LEAF is composed of a high performance highly charged superconducting ECR ion source, a high voltage platform, a low energy transport beam line (LEBT), a 4-vane 81.25 MHz RFQ, a medium energy beam transport beam line (MEBT), a 81.25 MHz IH structure DTL, several experimental terminals and the necessary utilities.
Requirements List Available:	Yes
Approval Date:	01-Aug-2014
Status of Contracting:	80% of the items are contracted

Construction scheduled to start:	01-Jan-2016
Estimated Project Cost:	80 M CNY
Estimated Construction Duration:	5 years
Type of Equipment to be Purchased:	vacuum components, RF-equipment, beam diagnostics, Nb_3Sn wire, cryogenic instruments, 4.2 K cryo-cooler, room temperature magnets, high current power supplies, high voltage power supplies, high purity copper.
Project Leader(s):	Hongwei ZHAO
Affiliation:	Institute of Modern Physics, Chinese Academy of Sciences
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Contact Person(s):	Liangting SUN
Affiliation:	Institute of Modern Physics, Chinese Academy of Sciences
e-mail:	sunlt@impcas.ac.cn

Space Environment Simulation and Research Infrastructure (SESRI)

Project Location:	People's Republic of China
Project Type:	New Project
Project Description:	The SESRI is a new accelerator facility dedicated to space science study in material physics, biophysics and interdisciplinary researches in China. The facility can provide extensive stable ion beams from proton to $^{209}Bi^{32+}$. The maximal energy of the proton is 300 MeV, and that of the $^{209}Bi^{32+}$ is 7 MeV/u.
Requirements List Available:	Yes
Approval Date:	21-Sep-2015
Status of Contracting:	Under progress
Construction scheduled to start:	08-Jan-2018
Estimated Project Cost:	50 M USD
Estimated Construction Duration:	5 years

Project Region: Asia

Type of Equipment to be Purchased:	Room temperature magnets, power supplies, vacuum components, magnetic alloy-loaded cavity, RF power source, beam diagnostics.
Project Leader(s):	Jiancheng Yang
Affiliation:	Institute of Modern Physics, Chinese Academy of Sciences
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Contact Person(s):	Shuang Ruan
Affiliation:	Institute of Modern Physics, Chinese Academy of Sciences
e-mail:	ruanshuang@impcas.ac.cn

Super Tau Charm Facility (STCF) China

Project Location:	People's Republic of China
Project Type:	New Project
Project Description:	A dual-ring electron-positron collider, center-of-mass energy 2-7GeV.
Requirements List Available:	Not available yet.
Approval Date:	Not yet, might be approved in five years.
Status of Contracting:	Not contracted.
Construction scheduled to start:	01-June-2026 (predicted)
Estimated Project Cost:	600 M USD (4000 M CNY)
Estimated Construction Duration:	5 years
Type of Equipment to be Purchased:	Vacuum components, RF-equipment and beam diagnostics, etc.
Project Leader(s):	Haiping Peng, Yangheng Zheng, Qing Luo
Affiliation:	University of Science and Technology of China
e-mail:	penghp@ustc.edu.cn

Project Region: Asia

Contact Person(s):	Qing Luo
Affiliation:	University of Science and Technology of China
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Beam intensity upgrade of the J-PARC Main Ring

Project Location:	Japan
Project Type:	Upgrade
Project Description:	Beam intensity upgrade of the J-PARC Main Ring for the long baseline neutrino oscillation experiment with Hyper-Kamiokande
Requirements List Available:	
Approval Date:	December-2019
Status of Contracting:	Contracting will be started in February-2020
Construction scheduled to start:	February-2020
Estimated Project Cost:	4.3 billion yen
Estimated Construction Duration:	7 years
Type of Equipment to be Purchased:	RF-systems, magnetic horns, etc.
Project Leader(s):	TBD

Affiliation:	KEK
e-mail:	
Contact Person(s):	T. Koseki
Affiliation:	KEK
e-mail:	tadashi.koseki@kek.jp

Shanghai Soft X-ray Free-Electron Laser User Facility (SXFEL-UF)

Project Location:	People's Republic of China
Project Type:	Upgrade
Project Description:	Based on SXFEL test facility, the SXFEL User Facility will upgrade the linac energy from 0.84 GeV to 1.5 GeV, extend one undulator line to support 3 nm FEL output, build one new undulator line to provide SASE output down to 2 nm, build two beamlines and five end-stations.
Requirements List Available:	No
Approval Date:	4-Jan-2016
Status of Contracting:	95% of the items are contracted
Construction scheduled to start:	20-Nov-2016
Estimated Project Cost:	752 M CNY
Estimated Construction Duration:	4 years
Type of Equipment to be Purchased:	Optical components, X-ray detectors, etc.

Project Region: Asia

Project Leader(s):	Zhentang Zhao, D. Wang, Zhi liu, Qiang Gu, Bo Liu
Affiliation:	SARI, ShanghaiTech
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Contact Person(s):	Shanchuan Yan
Affiliation:	SARI
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Beam intensity upgrade of the J-PARC Main Ring

Project Location:	Thailand
Project Type:	New Project
Project Description:	II (SPS-II) accelerator complex is the second synchrotron light source in Thailand. It consists of two main components: a 3 GeV injector linac and a 3 GeV electron storage ring. The injector linac, based on C-band accelerating structures, is intended to be utilized as the source for a Soft X-ray Free Electron Laser (SXFEL) in the future. Electrons are supplied to the linac by a laser-induced photocathode RF gun. The 3 GeV storage ring has a circumference of 321 m and the electron beam emittance of 0.9 nm-rad. The ring consists of 14 Double Triple Bend Achromat (DTBA) cells, resulting in 14 long and 14 short straights. Maximum stored beam current will be 300 mA. Beam injection to the storage ring is executed with a Pulsed Multipole magnet, which is designed based on the Non-Linear Kicker (NLK) magnet. The storage ring RF system has a frequency of 500 MHz with the accelerating voltage of 2.2 – 3.6 MV. All the RF cavities are normal conducting and the RF power is supplied by solid-state RF amplifiers together with Digital Low-Level RF (DLLRF) controllers. Third harmonic cavities (Landau cavities) will be installed to

	suppress beam instabilities. Aluminum is the preferred material for SPS-II vacuum chambers.
Requirements List Available:	Yes
Approval Date:	January 2020
Status of Contracting:	-
Construction scheduled to start:	2022
Estimated Project Cost:	300M USD
Estimated Construction Duration:	6 years
Type of Equipment to be Purchased:	RF system, beam diagnostics, vacuum components, vacuum pumps, power supplies, insertion devices, injector magnets, electron gun, laser system and control instruments
Project Leader(s):	Dr. Prapong Klysubun
Affiliation:	Synchrotron Light Research Institute (SLRI)
e-mail:	pklysubun@slri.or.th
Contact Person(s):	Porntip Sudmuang
Affiliation:	Synchrotron Light Research Institute (SLRI)
e-mail:	porntip@slri.or.th

Siam Photon Source-II

Project Location:	Thailand
Project Type:	New Project
Project Description:	Siam Photon Source-II (SPS-II) accelerator complex is the second synchrotron light source in Thailand. It consists of two main components: a 3 GeV injector linac and a 3 GeV electron storage ring. The injector linac, based on C-band accelerating structures, is intended to be utilized as the source for a Soft X-ray Free Electron Laser (SXFEL) in the future. Electrons are supplied to the linac by a laser-induced photocathode RF gun. The 3 GeV storage ring has a circumference of 321 m and the electron beam emittance of 0.9 nm-rad. The ring consists of 14 Double Triple Bend Achromat (DTBA) cells, resulting in 14 long and 14 short straights. Maximum stored beam current will be 300 mA. Beam injection to the storage ring is executed with a Pulsed Multipole magnet, which is designed based on the Non-Linear Kicker (NLK) magnet. The storage ring RF system has a frequency of 500 MHz with the accelerating voltage of 2.2 – 3.6 MV. All the RF cavities are normal conducting and the RF power is supplied by solid-state RF amplifiers together with Digital Low-Level RF (DLLRF)

	controllers. Third harmonic cavities (Landau cavities) will be installed to suppress beam instabilities. Aluminum is the preferred material for SPS-II vacuum chambers.
Requirements List Available:	Yes
Approval Date:	January 2020
Status of Contracting:	-
Construction scheduled to start:	2022
Estimated Project Cost:	300M USD
Estimated Construction : Duration:	6 years
Type of Equipment to be Purchased:	RF system, beam diagnostics, vacuum components, vacuum pumps, power supplies, insertion devices, injector magnets, electron gun, laser system and control instruments
Project Leader(s):	Dr. Prapong Klysubun
Affiliation:	Synchrotron Light Research Institute (SLRI)
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Contact Person(s):	Porntip Sudmuang
Affiliation:	Synchrotron Light Research Institute (SLRI)
e-mail:	porntip@slri.or.th

Project Region: Europe

Advanced WAKEfield Experiment (AWAKE)

Project Location:	Switzerland
Project Type:	On-going Project
Project Description:	Proton Driven Plasma Wakefield Experiment at CERN 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 and to electron acceleration demonstration. 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 density. These are both scientific and technical challenges.
Requirements List Available:	No
Approval Date:	28-Aug-13

Status of Contracting:	No started for Run 2
Construction scheduled to start:	1-Sep-13
Estimated Project Cost:	20 M CHF (material) Run1 (completed) 26 M CHF (material) Run 2
Estimated Construction Time:	4 years
Type of Equipment to be Purchased:	Equipment that was purchased includes, 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
e-mail:	muggli@mpp.mpg.de

Berlin Energy Recovery Linac Prototype (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 ΔE = 4 MeV (total energy = 6 MeV), Linac ΔE = > 24 MeV (total energy = > 30 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:	> 95% 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, 2x 9 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 Leader(s):	Andreas Jankowiak, Jens Knobloch
Affiliation:	Helmholtz-Zentrum Berlin GmbH
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Contact Person(s):	Same as Project Leader(s)

BESSY Variable pulse-length Storage Ring (VSR)

Project Location:	Germany
Project Type:	Upgrade
Project Description:	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. In a first step, a demonstration module with two 4-cell 1.5 GHz cavities will be installed, to demonstrate the technical and operational feasibility of high current HOM damped multi-cell cavities in a storage ring.
Requirements List Available:	No. Follow our regular tenders announced on www.service.bund.de
Approval Date:	01-June-2016
Status of Contracting:	50% 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
Affiliation:	Helmholtz-Zentrum Berlin GmbH

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Contact Person(s):	Same as Project Leader(s)

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
e-mail:	jim.clarke@stfc.ac.uk
Contact Person(s):	Same as Project Leader(s)

ELENA

Project Location:	Switzerland
Project Type:	New Project
Project Description:	ELENA is a small 30.4 m circumference ring, 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 in a new experimental zone. The installation of electro-static transfer lines to experiments in an old zone is close to completion. Commissioning of these lines using H- beam from a local source will take place during the second half of 2020.
Requirements List Available:	No
Approval Date:	2011
Status of Contracting:	Almost all equipment has been purchased and delivered.
Construction start:	~2014

Project Region: Europe

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)

ELI-Beamlines MEDical and multidisciplinary applications (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
e-mail:	pablo.cirrone@lns.infn.it
Contact Person(s):	Same as Project Leader(s)

Extreme Light Infrastructure - Nuclear Physics (ELI-NP)

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

Project Region: Europe

Affiliation:	IFIN-HH/ELI-NP
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Contact Person(s):	Calin Alexandru Ur
Affiliation:	IFIN-HH/ELI-NP
e-mail:	calin.ur@eli-np.ro

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 accelerator-driven 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:	>90% of accelerator items for construction phase are contracted
Construction scheduled to start:	1-June-2014
Estimated Project Cost:	1.843 B EUR (2013)

Project Region: Europe

Estimated Construction Duration:	Construction phase 2013-2025, Initial Operations phase 2019-2025, Steady State Operations phase 2026 onwards
Type of Equipment to be Purchased:	RF modulators, RF power sources, vacuum equipment, power supplies, spare parts, consumables, services and materials related to installation, tooling and lifting
Project Leader(s):	John Womersley (Director General), Mark Anthony (Project Director), Mirko Menninga (Head of Supply, Procurement and Logistics Division)
Affiliation:	European Spallation Source
e-mail:	John.Womersley@esss.se, Mark.Anthony@esss.se, Mirko.Menninga@esss.se
Contact Person(s):	Same as Project Leaders
Affiliation:	
e-mail:	

Facility for Antiproton and Ion Research (FAIR)

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
Contact Person(s):	Ingo Peter

Project Region: Europe

Affiliation:	GSI
e-mail:	i.peter@gsi.de

Future Circular Collider (FCC) study

Project Location:	Switzerland and France
Project Type:	New Project
Project Description:	Design study of a large-scale research infrastructure that can be implemented in two consecutive stages: -Stage 1: Highest luminosity energy-frontier circular electron-positron collider (FCC-ee) with a circumference of about 100 km for precision studies of Z, W and Higgs bosons, and the top quark, providing unprecedented sensitivity to new physics. -Stage 2: Energy-frontier hadron collider (FCC-hh), housed in the same infrastructure, with a proton-proton collision energy of 100 TeV and a corresponding energy in heavy-ion collisions, expanding the direct discovery potential to a new energy scale.
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:	Site investigations and construction of the underground and surface infrastructures, general technical infrastructures and plants (reliable and energy efficient electricity distribution and cooling and ventilation systems, fault-tolerant systems). Stage 1: SRF cavities at 400 and 800 MHz and associated cryogenics infrastructure, high-efficiency RF power sources, large-scale accelerator vacuum system optimized for the expected level of synchrotron radiation with high-energy photons, energy-efficient low-field iron dominated accelerator magnets, beam diagnostics equipment. Stage 2: Superconducting accelerator magnets with a field of about 16 T, energy-efficient large-scale cryogenics infrastructure, collimation system, radiation- and fault tolerant electronics.
Project Leader(s):	Michael Benedikt
Affiliation:	CERN
e-mail:	michael.benedikt@cern.ch
Contact Person(s):	Same as project leader

Project Region: Europe

Affiliation:	
e-mail:	

Ferninfrarot Linac Und Test Experiment (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, Modulator for 45MW klystron, Solid State Amplifier, MTCA timing system components
Project Leader(s):	Dr.-Ing. R. Ruprecht
Affiliation:	KIT
e-mail:	robert.ruprecht@kit.edu
Contact Person(s):	Dr.-Ing. R. Ruprecht Dr. M. Schuh Dr. A. Bernhard
Affiliation:	KIT
e-mail:	robert.ruprecht@kit.edu marcel.schuh@kit.edu axel.bernhard@kit.edu

High Luminosity LHC (HiLumi LHC, HL-LHC)

Project Location:	Switzerland
Project Type:	Project Upgrade
Project Description:	https://edms.cern.ch/ui/file/1723389/1/ HL-LHC_in_a_nutshell.pdf https://project-hl-lhc-industry.web.cern.ch/
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

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

International Fusion Materials Irradiation Facility - Demo Oriented NEutron Source (IFMIF-DONES)

Project Location:	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)

Iranian Light Source Facility (ILSF)

Project Location:	Iran
Project Type:	New Project
Project Description:	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&D laboratory. The project is currently in R&D (Finalizing the Basic Design) stage while the R&D Labs, Administration Building, Guesthouse and Infrastructures are under construction.
Requirements List Available:	No
Approval Date:	01-Oct-2010

Project Region: Europe

Status of Contracting:	Partially Funded by the Government, Financing (negotiations in progress)
Construction scheduled to start:	May 2018
Estimated Project Cost:	300M USD
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
Affiliation:	Institute for Research in Fundamental Sciences, Iranian Light Source Facility
e-mail:	Javad.rahighi@ipm.ir
Contact Person(s):	Ehsan Salimi
Affiliation:	Iranian Light Source Facility
e-mail:	Salimi.ehsan@ipm.ir

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
Affiliation:	CERN
e-mail:	malika.meddahi@cern.ch
Contact Person(s):	Same as Project Leader(s)

Mainz Energy-recovering Superconducting Accelerator (MESA)

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 powersupllies, shelding
Project Leader(s):	Kurt Aulenbacher
Affiliation:	Institut für Kernphysik der Johannes Gutenberg-Universität Mainz
e-mail:	aulenbac@uni-mainz.de
Contact Person(s):	Same as Project Leader(s)

Multi-purpose hYbrid Research Reactor for High-tech Applications (MYRRHA phase 1 – Implementation)

Project Location:	Belgium
Project Type:	New Project
Project Description:	MYRRHA is designed as an Accelerator Driven System. In a first stage to a 600 MeV super-conducting linac, a 100 MeV proton linac will be constructed (until 2026). A connected proton target facility will serve for radio-isotope production.
Requirements List Available:	High level available, prototyping ongoing
Approval Date:	1-Jan-20
Status of Contracting:	Status of Contracting:
the present protoyping will gradually lead to industrial supplies in the coming years.	the present protoyping will gradually lead to industrial supplies in the coming years.
Construction scheduled to start:	Construction scheduled to start:
01-March-2020	01-March-2020
Estimated Project Cost:	Estimated Project Cost:
Project Leader(s):	Hamid Aït Abderrahim

Project Region: Europe

Affiliation:	SCK•CEN Belgian Nuclear Research Centre
e-mail:	haitabde@sckcen.be
Contact Person(s):	Adrian Fabich
Affiliation:	SCK•CEN Belgian Nuclear Research Centre
e-mail:	adrian.fabich@sckcen.be

Nuclotron-based Ion Collider facility (NICA)

Project Location:	Russia
Project Type:	New Project
Project Description:	The study of nuclear collisions in the NICA energy range will provide a unique possibility to investigate properties of highly heated and compressed nuclear matter including a state close to that realized in the very early time of Universe evolution. Though a huge body of experimental data has been accumulated, the region of high baryon density states is still poorly studied. The discussed JINR collider project NICA aims to get new knowledge on properties of extremely dense excited baryonic matter including a possible formation of predicted but still have not yet been observed unusual states and creation of a mixed quark-hadron phase.
Requirements List Available:	No
Approval Date:	11-Jan-11
Status of Contracting:	Collider building construction – in progress, Heavy ion linac and electron cooling system for the Booster - commissioned, Light ion linac – designing in progress; RF systems, electron cooling system for the Collider, high-vacuum chambers of the Booster and the Collider – delivery/fabrication in progress.
Construction scheduled to start:	1-Sep-15

Project Region: Europe

Estimated Project Cost:	500 M USD
Estimated Construction Time:	Construction completion November 2021 Commissioning 2022
Type of Equipment to be Purchased:	control and diagnostic electronics, high-vacuum equipment
Project Leader(s):	Grigory Trubnikov, Igor Meshkov, Andrei Butenko, Evgeny Syresin
Affiliation:	Joint Institute for Nuclear Research
e-mail:	trubnikov@jinr.ru, meshkov@jinr.ru, butenko@jinr.ru, esyresin@jinr.ru
Contact Person(s):	Igor Meshkov (meshkov@jinr.rumeshkov@jinr.ru)

Short Innovative Bunches and Accelerators at DESY (SINBAD)

Project Location:	Germany
Project Type:	
Project Description:	The SINBAD facility is a dedicated accelerator R&D facility currently under construction and partially in beam commissioning 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 20MeV 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.
Requirements List Available:	Yes
Approval Date:	20-Sep-16
Status of Contracting:	80% of the items are contracted
1-Jan-2020	
Estimated Project Cost:	40ME
Estimated Construction Time:	6
Type of Equipment to be Purchased:	Bunch Compressor equipment, X-band RF, high power laser components
Project Leader(s):	Florian Burkart
Affiliation:	DESY
e-mail:	Florian.Burkart@desy.de
Contact Person(s):	Ralph Assmann
Affiliation:	DESY
e-mail:	Ralph.assmann@desy.de

Sources for Plasma Accelerators and Radiation Compton with Laser And Beam (SPARC_LAB)

Project Location:	Italy
Project Type:	Project Upgrade
Project Description:	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 (> 1 kA) and low emittance (<2 mm-mrad), and of a high power laser (> 200 TW), able to produce ultra-short pulses (<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 (<30%) and high energy (> 10 □J) 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 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
Affiliation:	INFN-LNF
e-mail:	Massimo.Ferrario@lnf.infn.it
Contact Person(s):	Same as Project Leader(s)

Selective Production of Exotic Species (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:	80% of the items are contracted
Construction scheduled to start:	15-Dec-2012
Estimated Project Cost:	56 M€

Estimated Construction Time:	9 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 Leader(s):	Gianfranco Prete
Affiliation:	INFN-Laboratori Nazionali di Legnaro
e-mail:	Prete@nl.infn.it
Contact Person(s):	Giovanni Bisoffi
Affiliation:	INFN-Laboratori Nazionali di Legnaro
e-mail:	bisoffi@nl.infn.it

Super Charm-Tau Factory, Russia

Project Location:	Novosibirsk - Russia
Project Type:	New Project
Project Description:	e+e- collider with the beam energy from 1 GeV to 3 GeV and with Crab Waist collision scheme providing 1e35 cm-2s-1 peak luminosity at high energy and 1e34 cm-2s-1 peak luminosity at low energy. Longitudinal polarization of electron beam at the IP is available.
Requirements List Available:	No
Approval Date:	Expecting approval date is the end of 2020.
Status of Contracting:	According to the request, the project will be presented to the Russian Government in the end of 2019.
Construction scheduled to start:	Expecting starting date is 2021.
Estimated Project Cost:	500 M EUR
Estimated Construction Time:	7 years
Type of Equipment to be Purchased:	Detector systems, electronics, beam diagnostics, feedback systems, vacuum equipment, control system.
Project Leader(s):	Eugene Levichev
Affiliation:	Budker INP
e-mail:	levichev@inp.nsk.su
Contact Person(s):	Same as Project Leader(s)

Fourth Generation Light Source SKIF

Project Location:	Novosibirsk - Russia
Project Type:	New Project
Project Description:	Synchrotron light source with the beam energy of 3 GeV, natural emittance of 75 pm and circumference of 476 m.
Requirements List Available:	No
Approval Date:	October 2019
Status of Contracting:	Approved
Construction scheduled to start:	October 2019
Estimated Project Cost:	500 M EUR
Estimated Construction Time:	4 years
Type of Equipment to be Purchased:	Beam diagnostics, feedback systems, vacuum equipment, control system (hardware and software), power supplies.
Project Leader(s):	Eugene Levichev
Affiliation:	Budker INP
e-mail:	levichev@inp.nsk.su
Contact Person(s):	Same as Project Leader(s)

INFN-LNS Superconducting Cyclotron and relative beamlines Upgrade

Project Location:	Italy
Project Type:	Upgrade
Project Description:	The project of 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:	June 2019
Status of Contracting:	6% of the assets are contracted, 26% of the total cost
Construction scheduled to start:	2019

Project Region: Europe

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 converters, Beam line elements, Diagnostic equipment, Radiation monitors, Radiation shields, Water plant
Project Leader(s):	Mario Musumeci
Affiliation:	INFN Laboratori Nazionali del Sud, Catania, Italy
e-mail:	musumeci@lns.infn.it
Contact Person(s):	Danilo Rifuggiato INFN Laboratori Nazionali del Sud, Catania, Italy rifuggiato@lns.infn.it

ThomX

Project Location:	Orsay - France
Project Type:	New Project
Project Description:	Compact X-ray source based on Compton back-scattering. ThomX is a demonstator designed to be compact ~ 100m², tunable and reliable source. A industrial version 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:	Installation end of 2019 1st x ray beam in 2020
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 Region: Europe

Project Leader(s):	Hugues Monard
Affiliation:	Laboratoire de l'Accélérateur Linéaire, IN2P3, CNRS, Orsay, France
e-mail:	monard@lal.in2p3.fr
Contact Person(s):	Alexandre Loulergue
Affiliation:	SOLEIL, Gif-sur-Yvette, France
e-mail:	Alexander.loulergue@synchrotron-soleil.fr

Source Optimisée de Lumière d'Energie Intermédiaire du LURE upgrade (SOLEIL)

Project Location:	France
Project Type:	Upgrade
Project Description:	The goal of the SOLEIL upgrade project is to replace the present storage ring with a state-of-the-art multibend achromat (MBA)-based ultra-low-emittance storage ring and to renew or construct new beamlines to better exploit the enhanced performances of the source. Such a project will necessitate a major instrumental program, notably in magnets, vacuum systems, optics, sample positioning, data handling and analysis. The planning of the project started with a Conceptual Design Report in 2019.
Requirements List Available:	No.
Approval Date:	undefined
Status of Contracting:	To be clarified after the end of the TDR (by end 2021).
Construction scheduled to start:	To be clarified after the end of the TDR (by end 2021).

Estimated Project Cost:	To be clarified after the end of the TDR (by end 2021).
Estimated Construction Duration:	4 years
Type of Equipment to be Purchased:	Magnets including permanent magnets, insertion devices, vacuum components, RF-equipment, beam diagnostics, etc.
Project Leader(s):	undefined
Affiliation:	
e-mail:	
Contact Person(s):	Amor Nadji
Affiliation:	Synchrotron Soleil
e-mail:	amor.nadji@synchrotron-soleil.fr

South African Isotope Facility (SAIF)

Project Location:	South Africa
Project Type:	New Project
Project Description:	Construction of a new cyclotron, beam lines, target stations and associated infrastructure at iThemba LABS. The SAIF project will utilize a 70 MeV proton beam delivered to four target stations for radioisotope production in medical applications.
Requirements List Available:	Yes
Approval Date:	24-Oct-2018
Status of Contracting:	50% of the items are contracted
Construction scheduled to start:	06-Sep-2019
Estimated Project Cost:	580 M ZAR
Estimated Construction Duration:	3 years
Type of Equipment to be Purchased:	70 MeV cyclotron, beam line equipment, target stations, beam diagnostics.

Project Region: Europe

Project Leader(s):	Le Roux Strydom
Affiliation:	iThemba LABS
e-mail:	istrydom@tlabs.ac.za
Contact Person(s):	Faical Azaiez
Affiliation:	iThemba LABS
e-mail:	director@tlabs.ac.za

Diamond-II

Project Location:	U.K.
Project Type:	Upgrade
Project Description:	New booster and new low emittance MBA storage ring lattice
Requirements List Available:	No
Approval Date:	31-Dec-2021 (assumed)
Status of Contracting:	0% of the items are contracted
Construction scheduled to start:	01-Apr-2022
Estimated Project Cost:	> £100m
Estimated Construction Duration:	4.5 years
Type of Equipment to be Purchased:	Magnets, vacuum components, girders, RF cavities and amplifiers, power supplies, beam diagnostics, controls equipment, insertion devices.
Machine Project Leader:	R.P. Walker

Project Region: Europe

Affiliation:	Diamond Light Source Ltd.
e-mail:	r.p.walker@diamond.ac.uk
Contact Person(s):	
Affiliation:	
e-mail:	

South East European International Institute for Sustainable Technologies (SEEIIST)

Project Location:	To be defined (South East Europe)
Project Type:	New Project
Project Description:	The South East European International Institute for Sustainable Technologies (SEEIIST) proposes a joint research infrastructure focussed on heavy ion tumour therapy to boost research and cooperation in a region that recently was at war. Set up by eight countries in the region, the SEEIIST will soon start the process of selecting a site for the facility. This initiative's innovative baseline design exploits superconductivity for the synchrotron accelerator and gantry resulting in a reduction in cost, size, and power consumption with respect to existing facilities. It also includes a novel injector coupled to multi-ion sources, high beam intensities and flexible extraction for novel treatment methods. An innovative warm-magnet version is considered for a faster implementation. The reference particle is Carbon ions, reaching an energy of 430 MeV/u.

Requirements List Available:	Yes, no?
Approval Date:	
Status of Contracting:	0%
Construction scheduled to start:	2022
Estimated Project Cost:	200 MEURO
Estimated Construction Duration:	5 years
Type of Equipment to be Purchased:	Accelerator components (synchrotron)
Project Leader(s):	S. Damjanovic
Affiliation:	SEEIIST Association, Minister of Science of Montenegro
e-mail:	Sanja.Damjanovic@cern.ch
Contact Person(s):	M. Vretenar
Affiliation:	CERN
e-mail:	Maurizio.Vretenar@cern.ch

Powerful Energy Recovery Linac for Experiments (PERLE)

Project Location:	Orsay - France
Project Type:	New Project
Project Description:	PERLE is a proposed high power Energy Recovery Linac, designed on multi-turn configuration, based on SRF technology, to be hosted at Orsay-France in an international collaborative effort between LP2I (Formerly LAL and IPNo) and CERN, JLAB, STFC-ASTeC Daresbury, Liverpool University and BINP-Novosibirsk. PERLE will be a unique leading edge facility designed to push advances in accelerator technology, to provide intense and highly flexible test beams for component development. In its final configuration, PERLE provides a 500 MeV electron beam using high current (20 mA) acceleration during three passes through 801.6 MHz cavities.
Requirements List Available:	No
Approval Date:	Not yet
Status of Contracting:	Not started yet

Construction scheduled to start:	Staged construction (mainly 2 stages). First stage will most probably started on 2023
Estimated Project Cost:	Around 27 MEURO (without infrastructure cost)
Estimated Construction Duration:	8-9 years
Type of Equipment to be Purchased:	SRF structures, magnets, vacuum components, RF-equipment, beam diagnostics, Cryoplant…
Project Leader(s):	Walid Kaabi
Affiliation:	IJCLab-IN2P3-CNRS (Formerly LAL)
e-mail:	kaabi@lal.in2p3.fr
Contact Person(s):	Walid Kaabi
Affiliation:	IJCLab-IN2P3-CNRS (Formerly LAL)
e-mail:	kaabi@lal.in2p3.fr

New Laser Facility (INFN-LNS)

Project Location:	Italy
Project Type:	Upgrade of the Nuclear Physics Laboratory
Project Description:	Installation of an high power laser for particles acceleration and alaser-ion beams interactions
Requirements List Available:	no
Approval Date:	November 2019
Status of Contracting:	0%
Construction scheduled to start:	April 2020
Estimated Project Cost:	4 M EURO
Estimated Construction Duration:	3-4 years
Type of Equipment to be Purchased:	Laser, vacuum components, laser diagnostic, beam diagnostics, optical elements, mirrors, power supplies
Project Leader(s):	G A Pablo Cirrone
Affiliation:	INFN-LNS

e-mail:	pablo.cirrone@lns.infn.it
Contact Person(s):	
Affiliation:	
e-mail:	

X–ray Free Electron Laser Line of SwissFEL (ATHOS)

Project Location:	Switzerland
Project Type:	New Project
Project Description:	Athos is the soft x –ray Free Electron Laser line of SwissFEL using the first part of the linac (3 GeV). The Athos lines includes short magnetic chicanes in between every undulator segment in order to delay, compress or shift the bunch during the lasing process. This leads to a large variety of operation modes producing fs to sub fs FEL pulses from 250 eV to 1900 eV with variable polarization.
Requirements List Available:	Yes
Approval Date:	01-Jan-2017
Status of Contracting:	85% of the items are contracted
Construction scheduled to start:	01-Jan-2017
Estimated Project Cost:	44 MCHF

Estimated Construction Duration:	4 years
Type of Equipment to be Purchased:	vacuum components, undulator permanent magnets, RF-equipment, beam diagnostics, motorized mechanics, X ray mirrors, electromagnets
Project Leader(s):	Romain Ganter, Luc Patthey
Affiliation:	PSI
e-mail:	romain.ganter@psi.ch, luc.patthey@psi.ch
Contact Person(s):	Hans Heinrich Braun
Affiliation:	PSI
e-mail:	hans.braun@psi.ch

Extremely Brilliant Source (ESRF-EBS)

Project Location:	France
Project Type:	Upgrade
Project Description:	ESRF-EBS (Extremely Brilliant Source) is a 150M€ facility upgrade centered around the construction of a low-emittance light source that will increase the brilliance and coherence of the X-ray beams produced by a factor of 100, decreasing the horizontal emittance by a factor 30. This new source will be achieved by replacing the existing storage ring, a double-bend achromat (DBA) magnet sequence, with an hybrid multi-bend achromat (HMBA) design, developed at the ESRF.
Requirements List Available:	The projects is divided in three parts: the accelerator project, the beamlines projects and the data management projects. The new accelerator is now constructed and commissioned. Beamline and data management projects are in progress.
Approval Date:	
Status of Contracting:	No
Construction scheduled to start:	Dec-2015

Project Region: Europe

Estimated Project Cost:	75% of the items are contracted
Estimated Construction Duration:	Dec-2018
Type of Equipment to be Purchased:	150 M EURO
Project Leader(s):	Pantaleo Raimondi
Affiliation:	ESRF
e-mail:	pantaleo.raimondi@esrf.fr
Contact Person(s):	Jean-Luc Revol
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e-mail:	revoljl@esrf.fr

Décroissance, Excitation et Stockage d'Ions Radioactifs (DESIR)

Project Location:	France
Project Type:	New Project
Project Description:	The DESIR (Décroissance, Excitation et Stockage d'Ions Radioactifs) project aims to build a new low-energy beam facility at GANIL-SPIRAL2 to study the properties of exotic nuclei in unexplored regions of the nuclide chart. It emerged in 2010 and was gradually integrated into phase 2 of the SPIRAL2 project. After the suspension of the phase 2 development in 2015, the DESIR installation to accommodate, at first, the radioactive beams issued from SPIRAL2 / S3 (neutron-deficient nuclei, including refractory elements) and SPIRAL1 (light-to-medium mass nuclei produced by fragmentation) facilities. At a later stage (> 2030), neutron-rich nuclei produced within the phase 2 of the SPIRAL2 project will also become available. The first specificity of the DESIR facility is to provide various beam characteristics by integrating complementary beam preparation devices including gas catchers, radiofrequency quadrupoles, high resolution separators and ion traps in order to provide high quality beams to the users. Its second specificity is to be able to simultaneously integrate all the technical facets of low-energy experimentation on radioactive beams, using both

	trapping (DETRAP), laser spectroscopy (LUMIERE) and beta-decay spectroscopy (BESTIOL) techniques.	
Requirements List Available:	No	
Approval Date:	24-Oct-2018 (actual management board)	
Status of Contracting:	25% of the items are contracted	
Construction scheduled to start:	05-Aug-2021 (building)	
Estimated Project Cost:	26 M€	
Estimated Construction Duration:	5 years (2 for building)	
Type of Equipment to be Purchased:	Electrostatic beam lines components: electrostatic optics, vacuum, automatism and control-command systems, beam diagnostics, laser systems, electromagnetic and radiofrequency traps, beta-gamma particle detectors, nuclear safety and radioprotection systems	
Project Leader(s):	Franck VARENNE	Bertram BLANK (sci.)
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e-mail:	varenne@ganil.fr	blank@cenbg.in2p3.fr

Contact Person(s):	Jean-Charles THOMAS
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SPIRAL 2 Project

Project Location:	FRANCE (Caen)
Project Type:	New Project
Project Description:	The SPIRAL2 project is located on the GANIL site in Caen - France (Grand Accelerateur National d'Ions Lourds). This new facility is mainly composed of an injector (two ECR ions sources, a warm temperature RFQ pre-injector) and a superconducting linear accelerator operates at 4K (26 accelerating cavities at 88 MHz). This accelerator will produce deuteron, proton and heavy ion beams in a wide range of energies and intensities (until 40 MeV – 5 mA for D2 beam). Two experimental areas are dedicated to this facility in the fields of Neutron for Science (NFS) and very heavy and super heavy element production (S3 project). The linac beam commissioning started at the end of 2019, and our next objectives concern the power ramp up of the beam and the reliability/availability of this facility.
Requirements List Available:	no
Approval Date:	05/2005

Status of Contracting:	Done – except potential upgrades
Construction scheduled to start:	12/2010 (building)
Estimated Project Cost:	90 M EUROS
Estimated Construction Duration:	7 years 1st protons beam accelerated in December 2019 Beam commissioning and power ramp up planed until 2021
Type of Equipment to be Purchased:	For maintenance operations or upgrades : RF-equipment, beam diagnostics, vacuum/cryogenic components
Project Leader(s):	Patrick Dolegieviez
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Contact Person(s):	Robin Ferdinand (deputy project leader)
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Swiss Light Source 2.0 (SLS)

Project Location:	Switzerland
Project Type:	Upgrade
Project Description:	The project concerns an upgrade of the existing 2.4 GeV Swiss Light Source (SLS) to a diffraction limited source – SLS 2.0. This requires a complete rebuild of the electron storage ring which will be installed in the existing SLS tunnel. Major components to be manufactured by industry are given below as "type of equipment to be purchased". Renewal of some user beamlines is also included within the project.
Requirements List Available:	Conceptual Design Report available. Definitive requirements in preparation (for Spring 2020)
Approval Date:	Anticipated by 31st December 2020
Contracting status:	No items are contracted at the present time
Construction scheduled to start:	1st January 2021
Estimated Project Cost:	167 MCHF (investment costs 116 MCHF, other costs 51 MCHF).
Estimated duration:	4 years (including procurement, installation and commissioning)
Type of Equipment to be Purchased:	Permanent magnets, electromagnets, superconducting dipoles, NEG coated vacuum chambers, standard vacuum components (pumps, gauges, valves), girders

	and mechanical supports, beam diagnostics, insertion devices, power supplies, electronics, beamline front-ends, RF-equipment, beam diagnostics, Controls hardware, beamline optics, etc.
Project Leader(s):	Terence Garvey (accelerator project leader)), Phil Willmott (beamlines), H. Braun (overall project head).
Affiliation:	PSI
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Contact Person(s):	H. Braun
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Double Annular Φ Factory for Nice Experiments – (DAFNE)

Project Location:	Italy
Project Type:	Upgrade
Project Description:	Lepton collider aiming at providing physics events to high energy and nuclear physics experiments
Requirements List Available:	no
Approval Date:	Jan 2018
Status of Contracting:	
Construction scheduled to start:	May 2018
Estimated Project Cost:	0.7 M (EURO)
Estimated Construction Duration:	1 year, already completed
Type of Equipment to be Purchased:	Vacuum components, beam diagnostics, power supplies
Project Leader(s):	Milardi Catia
Affiliation:	INFN - LNF
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Project Region: Europe

Contact Person(s):	Milardi Catia
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