

Bando n. LNF/T3/25101/PNRR – Settimo verbale della Commissione esaminatrice - Allegato n. 1

SETTIMO VERBALE DI ESPLETAMENTO DEL CONCORSO PER TITOLI ED ESAME COLLOQUIO DI CUI AL BANDO LNF/T3/25101/PNRR PER N. 20 POSTI PER IL PROFILO PROFESSIONALE DI TECNOLOGO DI III LIVELLO PROFESSIONALE CON CONTRATTO DI LAVORO A TEMPO DETERMINATO DELLA DURATA DI 24 MESI

TESTI PROVA ORALE

QUESITI BUSTA 1

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva qualche esempio di funzione matematica in Excel
- Il candidato legga e traduca il seguente testo in lingua inglese:

An intense laser can ionize matter and accelerate the resulting ions into a beam. Creating and accelerating ions in a single compact system offers an advantage over the bulky conventional combination of a separate ion source and a cyclotron or synchrotron.

QUESITI BUSTA 2

- Il candidato illustri la propria pubblicazione n.5
- Il candidato descriva a cosa serve la sezione Animazione di Powerpoint
- Il candidato legga e traduca il seguente testo in lingua inglese:

Laser-driven ion beams could be useful in various applications. Controlling what ions end up in the beam can be difficult in laser-acceleration systems. The problem is that the target materials inevitably contain contaminants, primarily hydrogen.

QUESITI BUSTA 3

- Il candidato illustri la propria pubblicazione n.7
- Il candidato descriva a cosa serve la sezione Carattere di Word
- Il candidato legga e traduca il seguente testo in lingua inglese:

Although proton therapy is currently the most widespread ion radiotherapy, a treatment that employs larger ions, such as carbon, interests medical researchers because the ions' extra mass means they do more damage to a cancerous cell's DNA as they pass through. A reliable source of carbon-ion beams that is small enough to fit in a typical laboratory would facilitate more research on potential carbon-ion therapies.

QUESITI BUSTA 4

- Il candidato illustri la propria pubblicazione n.2
- Il candidato descriva a cosa serve la sezione Celle di Excel
- Il candidato legga e traduca il seguente testo in lingua inglese:

Lasers can accelerate ions out of a material in a few ways. The most common method is known as target normal sheath acceleration (TNSA). In it, the laser ionizes surface atoms and produces free electrons that work their way through the material and escape out the back. As they leave, they create a strong electric field that ionizes and accelerates atoms on the back surface.

QUESITI BUSTA 5

- Il candidato illustri la propria pubblicazione n.5
- Il candidato descriva a cosa serve la funzione SOMMA in Excel
- Il candidato legga e traduca il seguente testo in lingua inglese:

Because target normal sheath acceleration (TNSA) acts on the surface atoms, it disproportionately accelerates contaminants, which sit primarily on the surface and are difficult to avoid or remove. Radiation-pressure acceleration, on the other hand, acts on the bulk of the material.



QUESITI BUSTA 6

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva cosa è un foglio di calcolo elettronico
- Il candidato legga e traduca il seguente testo in lingua inglese:

The Gemini laser at the Central Laser Facility, part of the UK's Rutherford Appleton Laboratory, provided pulses for a recent experiment on laser-driven ion acceleration. The shape of the pulses' temporal profiles resulted in the preferential acceleration of carbon ions over proton contaminants that usually dominate ion beams.

QUESITI BUSTA 7

- Il candidato illustri la propria pubblicazione n.8
- Il candidato descriva cosa è la CPU – Central Processing Unit
- Il candidato legga e traduca il seguente testo in lingua inglese:

The realistic laser profile had a shoulder before the peak intensity. That shoulder resulted from the two plasma mirrors that the researchers used to smooth the laser profile and increase its intensity contrast. A plasma mirror is a polished surface that when excited by a high-intensity laser forms a plasma, which acts as a highly reflective active optical element.

QUESITI BUSTA 8

- Il candidato illustri la propria pubblicazione n.9
- Il candidato descriva a cosa serve la sezione Paragrafo di Word
- Il candidato legga e traduca il seguente testo in lingua inglese:

Other methods exist to reduce the contaminants in ion beams, including running an electric current through the target before irradiation and ablating the material first with another laser. Most of the methods, however, are complicated to implement and too destructive for the sorts of thin samples needed to access the efficient light-sail acceleration regime.

QUESITI BUSTA 9

- Il candidato illustri la propria pubblicazione n.7
- Il candidato descriva a cosa serve il programma Excel
- Il candidato legga e traduca il seguente testo in lingua inglese:

To get meaningful and reproducible results that can be compared with those from conventional sources, researchers need a well-defined ion species with a well-defined energy distribution. The light-sail acceleration setup offers those benefits in a system compact enough for a typical lab.

QUESITI BUSTA 10

- Il candidato illustri la propria pubblicazione n.6
- Il candidato descriva a cosa serve il programma Word
- Il candidato legga e traduca il seguente testo in lingua inglese:

Shine a flashlight at a cat at night, and its eyes will appear to glow. That's because cats—along with owls and many other nocturnal animals—have a reflective tissue layer behind their retinas. The adaptation increases their sensitivity to low levels of illumination by giving the retina a second chance to absorb photons.

QUESITI BUSTA 11

- Il candidato illustri la propria pubblicazione n.9
- Il candidato descriva a cosa serve il programma Powerpoint
- Il candidato legga e traduca il seguente testo in lingua inglese:

A similar strategy can boost the amount of light absorbed by any material. For a material placed in an optical cavity, light passes through it many times. And under the right conditions, nearly all the light is eventually absorbed, even by a weakly absorbing medium. Such a system is an example of what's known as a coherent perfect absorber (CPA), which achieves its performance with the help of interference effects.

QUESITI BUSTA 12

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva cosa rappresenta un bit
- Il candidato legga e traduca il seguente testo in lingua inglese:

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Consider a laser hitting a slab of material. Some of the light is reflected, some transmitted, and some absorbed. If two antiparallel beams enter opposite sides of the material, they can interfere such that the transmitted and reflected light in each direction cancel. In that case, all of the energy is absorbed.

QUESITI BUSTA 13

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva cosa è un browser
- Il candidato legga e traduca il seguente testo in lingua inglese:

The conditions for coherent perfect absorption can be reframed as those for lasing just run in reverse. With each round trip through a laser, the light amplification in the gain medium must balance the energy losses in the laser cavity. In a CPA, the light absorbed in each round trip must be equal to the light that enters the cavity during that time.

QUESITI BUSTA 14

- Il candidato illustri la propria pubblicazione n.5
- Il candidato indichi alcuni esempi di browser
- Il candidato legga e traduca il seguente testo in lingua inglese:

The degenerate-cavity concept should work for all electromagnetic waves, for acoustic waves, and for other waves. "We believe that our results open up new ways to detect weak signals," says Katz, "even when they get perturbed by passing through the Earth's turbulent atmosphere," as is the case for faint starlight in astronomy, for example.

QUESITI BUSTA 15

- Il candidato illustri la propria pubblicazione n.7
- Il candidato descriva cosa è un server
- Il candidato legga e traduca il seguente testo in lingua inglese:

The best atomic clocks, which mark time by measuring the frequency of an atomic resonance, operate with an uncertainty of around 10⁻¹⁸. If left to run for the age of the universe, they'd lose less than a single second. That astonishing precision is made possible by laser spectroscopy.

QUESITI BUSTA 16

- Il candidato illustri la propria pubblicazione n.2
- Il candidato descriva cosa è un modem
- Il candidato legga e traduca il seguente testo in lingua inglese:

The quantum mechanical laws that give rise to atomic structure aren't limited to protons, neutrons, and electrons. One can, in principle, construct a hydrogen-like atom out of any two particles of opposite charge, or replace any electron in a larger atom with any other negatively charged particle. Laser spectroscopy on those exotic atoms can probe the properties of both the unusual particles and the ordinary ones.

QUESITI BUSTA 17

- Il candidato illustri la propria pubblicazione n.5
- Il candidato descriva come un computer può essere esposto a virus
- Il candidato legga e traduca il seguente testo in lingua inglese:

By studying the spectrum of antihydrogen, researchers can search for differences between matter and antimatter. And muonic hydrogen, in which a muon replaces the electron, has been used to measure the charge radius of the proton: The muon, 200 times more massive than the electron, occupies a smaller atomic orbital that's more sensitive to the proton's nonzero size.

QUESITI BUSTA 18

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva cosa è un database
- Il candidato legga e traduca il seguente testo in lingua inglese:

Masaki Hori of the Max Planck Institute of Quantum Optics and his colleagues have made the first laser spectroscopic measurement on an atom containing a meson. Specifically, they've studied pionic helium, in which one of the electrons in an ordinary helium atom is replaced by a negatively charged pion.

QUESITI BUSTA 19

- Il candidato illustri la propria pubblicazione n.8
- Il candidato descriva cosa è un file pdf
- Il candidato legga e traduca il seguente testo in lingua inglese:

Because an atom's spectroscopic resonances depend on the masses of its constituent particles, Hori and colleagues' technique could eventually lead to an improved measurement of the charged pion's mass, currently known to a fractional precision of 10^{-6} . In turn, through kinematic analysis of the charged pion's main decay channel—which yields a muon and a muon antineutrino—the pion mass measurement could provide a much-needed additional constraint on the neutrino mass.

QUESITI BUSTA 20

- Il candidato illustri la propria pubblicazione n.9
- Il candidato descriva quali file possono essere convertiti in pdf
- Il candidato legga e traduca il seguente testo in lingua inglese:

The pion's short lifetime poses an experimental challenge. Positrons and antiprotons, the components of antihydrogen and numerous other exotic atoms, live effectively forever—as long as they're kept away from their antiparticles—so there's no limit on how long they can be cooled, trapped, or shuttled around with electric and magnetic fields. Even the muon, with a lifetime of $2 \mu\text{s}$, survives long enough to be decelerated and inserted into an atom.

QUESITI BUSTA 21

- Il candidato illustri la propria pubblicazione n.7
- Il candidato descriva quali sono le principali misure per la sicurezza informatica
- Il candidato legga e traduca il seguente testo in lingua inglese:

The pion allows no such freedom. There's no time to do anything more sophisticated than take the pions straight off a beamline, smash them into a target element of interest, and hope that some of them displace atomic electrons to form pionic atoms.

Unfortunately, the resulting atoms have even shorter lifetimes than the pions they contain.

QUESITI BUSTA 22

- Il candidato illustri la propria pubblicazione n.6
- Il candidato descriva come si misura la velocità di un processore
- Il candidato legga e traduca il seguente testo in lingua inglese:

The experimental apparatus for making and detecting pionic helium is shown in figure 1. To hold the liquid helium for their target, the researchers needed a vessel with walls sturdy enough to contain the cryogenic fluid but thin enough for the pions to pass right through. They chose a tube-shaped container made of aluminum with walls 0.5 mm thick.

QUESITI BUSTA 23

- Il candidato illustri la propria pubblicazione n.9
- Il candidato descriva quali sono le principali unità periferiche di un computer
- Il candidato legga e traduca il seguente testo in lingua inglese:

Particle accelerators are among the most important scientific tools of the modern age. Major accelerator facilities, such as the 27-km-circumference Large Hadron Collider in Switzerland, where the Higgs boson was recently discovered, allow scientists to uncover fundamental properties of matter and energy. But the particle energies needed to explore new regimes of physics have increased to the TeV scale and beyond, and accelerator facilities based on conventional technologies are becoming prohibitively large and costly.

QUESITI BUSTA 24

- Il candidato illustri la propria pubblicazione n.3
- Il candidato indichi un esempio di unità periferica di input
- Il candidato legga e traduca il seguente testo in lingua inglese:

Efforts are underway to develop more compact, less expensive accelerator technologies. One approach, a dielectric laser accelerator (DLA), uses an ultrafast IR laser to deliver energy to electrons inside a microchip-scale



device. *Efficient, ultrafast solid-state lasers and semiconductor fabrication methods developed over the past two decades have enabled a new breed of photonic devices that can sustain accelerating fields one to two orders of magnitude larger than conventional microwave-cavity accelerators*

QUESITI BUSTA 25

- Il candidato illustri la propria pubblicazione n.3
- Il candidato indichi un esempio di unità periferica di output
- Il candidato legga e traduca il seguente testo in lingua inglese:

The approach has the potential to dramatically shrink particle accelerators, thereby enabling ultrafast tabletop electron diffraction and microscopy experiments and tunable x-ray sources. An international effort is now underway to develop a laser-driven accelerator integrated on a silicon photonics platform: an "accelerator on a chip."

QUESITI BUSTA 26

- Il candidato illustri la propria pubblicazione n.5
- Il candidato descriva cosa è il backup
- Il candidato legga e traduca il seguente testo in lingua inglese:

Shortly after the first laser was demonstrated at Hughes Research Laboratories in 1960, scientists began envisioning ways to harness the newly realized power for particle acceleration. The idea was appealing because the corresponding reduction in wavelength by four orders of magnitude—from the RF regime of conventional microwave accelerators to the optical regime of lasers—implied shrinking accelerator structures down to the micron scale.

QUESITI BUSTA 27

- Il candidato illustri la propria pubblicazione n.7
- Il candidato descriva quali sono i principali sistemi operativi per pc
- Il candidato legga e traduca il seguente testo in lingua inglese:

The required technology for laser-driven accelerators did not exist in the 1960s. It took several decades for solid-state lasers, optical materials, and nanofabrication to reach the point where researchers could pursue the idea in earnest.

QUESITI BUSTA 28

- Il candidato illustri la propria pubblicazione n.2
- Il candidato descriva cosa è il wi-fi
- Il candidato legga e traduca il seguente testo in lingua inglese:

A good first step for demonstrating a new acceleration mechanism is to send a test beam of particles through the device and observe the particles' energy distribution, or spectrum, following the interaction. The SLAC experiment used the 60 MeV electron beam provided by a conventional RF accelerator, the Next Linear Collider Test Accelerator, that had been converted into a test bed for developing new concepts.

QUESITI BUSTA 29

- Il candidato illustri la propria pubblicazione n.5
- Il candidato descriva come è possibile modificare un file pdf
- Il candidato legga e traduca il seguente testo in lingua inglese:

Building on the strong collaborations formed under LEAP and AXiS, in 2015 we assembled an international team of scientists and accelerator engineers with an array of expertise spanning accelerator science, photonics, laser technology, materials science, computer simulation, and nanofabrication. The team included six universities, three government labs, and one industrial partner.

QUESITI BUSTA 30

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva cosa si intende per PEC
- Il candidato legga e traduca il seguente testo in lingua inglese:

Any accelerator design based on pulsed particle beams and pulsed electromagnetic energy must rely on a series of sequential acceleration stages. For a laser-driven accelerator, the length of each stage is determined by the interaction time of a particle bunch with a laser pulse. That time is set by their respective durations, typically on the order of 0.1–1 ps.



QUESITI BUSTA 31

- Il candidato illustri la propria pubblicazione n.8
- Il candidato indichi quale è la combinazione di comandi per "Taglia e Incolla"
- Il candidato legga e traduca il seguente testo in lingua inglese:

To maintain the phase-velocity match of the laser wave and the particle beam over many stages, the laser must be recoupled at each stage and its phase and amplitude carefully controlled. A compact and elegant solution is to couple the laser beam into on-chip photonic waveguides so the laser light can be split and precisely delivered to each successive segment of the accelerator.

QUESITI BUSTA 32

- Il candidato illustri la propria pubblicazione n.9
- Il candidato indichi un applicativo per videoscrittura
- Il candidato legga e traduca il seguente testo in lingua inglese:

Compact accelerators with target energies in the few-MeV range are attractive near-term candidates for use in medical dosimetry. Electron sources based on laser-driven on-chip accelerators could potentially fit on the end of an optical fiber, be placed on a scanning platform at the surface of a sample, or even get inserted into living tissue.

QUESITI BUSTA 33

- Il candidato illustri la propria pubblicazione n.7
- Il candidato indichi un applicativo per effettuare presentazioni
- Il candidato legga e traduca il seguente testo in lingua inglese:

A self-contained multi-MeV electron source based on integrated photonic particle accelerators could enable minimally invasive cancer treatments and adjustable-dose real-time deposition with improved dose control. One could envision an encapsulated micro-accelerator, built onto the end of an optical fiber, being placed at a tumor site using standard endoscopic methods.

QUESITI BUSTA 34

- Il candidato illustri la propria pubblicazione n.6
- Il candidato indichi un applicativo per effettuare grafici al computer
- Il candidato legga e traduca il seguente testo in lingua inglese:

Although a high-energy particle collider based on dielectric laser accelerator (DLA) technology is admittedly decades away, considerations for physics at the TeV scale indicate that DLAs have the potential to achieve the required luminosities with reasonable power consumption. The highest priority challenges for such future applications largely pertain to the transport of high average beam currents in the micron-scale apertures of DLA devices.

QUESITI BUSTA 35

- Il candidato illustri la propria pubblicazione n.9
- Il candidato indichi un applicativo per costruire tabelle al computer
- Il candidato legga e traduca il seguente testo in lingua inglese:

The idea of laser-driven accelerators was first proposed shortly after the demonstration of the laser. Now ACHIP is a worldwide collaboration (see figure 6) aimed at realizing an integrated laser-driven accelerator on a chip. The program melds the capabilities of universities and government laboratories and therefore has access to the facilities and talent needed to address key challenges in the endeavor.

QUESITI BUSTA 36

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva perché occorre cambiare la password di accesso frequentemente
- Il candidato legga e traduca il seguente testo in lingua inglese:

The emerging field of laser accelerators has engaged and trained scientists who can lead the development of new tools that will enable discoveries in areas of physics ranging from atomic and molecular to chemical, biological, and medical. Fifty years ago the laser was a solution looking for a problem. Today it is a critical "stealth utility" that enables the technology of the modern world.

QUESITI BUSTA 37

- Il candidato illustri la propria pubblicazione n.10
- Il candidato descriva come si realizzano videoconferenze mediante computer
- Il candidato legga e traduca il seguente testo in lingua inglese:

In a world-first implementation, the linear accelerator of the SACLA X-ray free-electron laser is now being used as the beam injector for the storage ring of the SPring-8 synchrotron light source. Project leader Toru Hara explains the technical motivations for the upgrade and the long-term operational benefits.

QUESITI BUSTA 38

- Il candidato illustri la propria pubblicazione n.1
- Il candidato descriva l'uso delle funzioni matematiche in Excel
- Il candidato legga e traduca il seguente testo in lingua inglese:

During the early-stage evaluation of the new beam-injection scheme, two other issues came into play: electron bunch purity and magnetic hysteresis of the kicker magnet. The electron bunch purity is a ratio of electron charges contained in an electron-injected RF bucket and an empty bucket on the storage ring.

QUESITI BUSTA 39

- Il candidato illustri la propria pubblicazione n.4
- Il candidato descriva come si usa la sezione "Animazione" di Powerpoint
- Il candidato legga e traduca il seguente testo in lingua inglese:

At the far-end of SACLA's linear accelerator, electron-beam pulses are deflected horizontally in three directions by a kicker magnet. The polarity of the kicker current is negative for BL2, zero for BL3 and positive for XSBT. As a consequence, the beam orbits of the pulses just after the beam injection (i.e. two to three times a minute) deviate from the optimum trajectory inside the XFEL undulators – seriously degrading pointing stability and laser power within the SACLA beamlines.

QUESITI BUSTA 40

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva come si usa la sezione "Carattere" di Word
- Il candidato legga e traduca il seguente testo in lingua inglese:

By using cutting-edge, short-period, in-vacuum undulator technologies in SPring-8-II, for example, the electron-beam energy will be reduced from 8 GeV to 6 GeV without changing the X-ray radiation energy range. Replacing accelerator electromagnets with permanent magnets will enable additional reductions in power consumption.

QUESITI BUSTA 41

- Il candidato illustri la propria pubblicazione n.5
- Il candidato descriva come si usa la sezione Celle in Excel
- Il candidato legga e traduca il seguente testo in lingua inglese:

Scientists in the Middle East broke ground for the SESAME light source in January 2003. Founder Eliezer Rabinovici describes the story behind this beacon for peaceful international collaboration, what its achievements have been, and what the future holds.

QUESITI BUSTA 42

- Il candidato illustri la propria pubblicazione n.7
- Il candidato descriva quale è la sintassi della sezione SOMMA in Excel
- Il candidato legga e traduca il seguente testo in lingua inglese:

CERN is a very appropriate venue for the inception of such a project. It was built after World War II to help heal Europe and European science in particular. Abdus Salam, as far back as the 1950s, identified the light source as a tool that could help thrust what were then considered "third-world" countries directly to the forefront of scientific research.

QUESITI BUSTA 43

- Il candidato illustri la propria pubblicazione n.2
- Il candidato indichi a cosa serve un foglio di calcolo elettronico
- Il candidato legga e traduca il seguente testo in lingua inglese:

Light source was very attractive thanks to the rich diversity of fields that can make use of such a facility, from biology through chemistry, physics and many more to archaeology and environmental sciences. Such a diversity would also allow the formation of a critical mass of real users in the region.

QUESITI BUSTA 44

- Il candidato illustri la propria pubblicazione n.5
- Il candidato descriva quale è la funzione della CPU in un computer
- Il candidato legga e traduca il seguente testo in lingua inglese:

The discovery of the Higgs boson at the LHC in 2012 changed the landscape of high-energy physics forever. After just a few short years of data-taking by the ATLAS and CMS experiments, this last piece of the Standard Model (SM) was proven to exist. Since then, the Higgs sector has been studied using a rapidly growing dataset and, so far, all measurements agree with the SM predictions within the experimental uncertainties.

QUESITI BUSTA 45

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva come si usa la sezione "Paragrafo" di Word
- Il candidato legga e traduca il seguente testo in lingua inglese:

The high-luminosity phase of the LHC (HL-LHC) will provide an order of magnitude more data starting from 2029, allowing precision tests of the properties of the Higgs boson and improved sensitivity to a wealth of new-physics scenarios. The HL-LHC will deliver to each of the ATLAS and CMS experiments approximately 170 million Higgs bosons and 120,000 Higgs-boson pairs over a period of about 10 years.

QUESITI BUSTA 46

- Il candidato illustri la propria pubblicazione n.8
- Il candidato descriva una possibile applicazione del programma Excel
- Il candidato legga e traduca il seguente testo in lingua inglese:

To cope with the increased number of interactions when proton bunches collide at the HL-LHC, the ATLAS collaboration is working hard to upgrade its detectors with state-of-the-art instrumentation and technologies. These new detectors will need to cope with challenging radiation levels, higher data rates and an extreme high-occupancy environment with up to 200 proton-proton interactions per bunch crossing

QUESITI BUSTA 47

- Il candidato illustri la propria pubblicazione n.9
- Il candidato descriva una possibile applicazione del programma Word
- Il candidato legga e traduca il seguente testo in lingua inglese:

The success of the research programme at the HL-LHC will strongly rely on the tracking performance, which in turn determines the ability to efficiently identify hadrons containing b and c quarks, in addition to tau and other charged leptons. Reconstructing individual particles in the HL-LHC collision environment with thousands of charged particles being produced within a region of about 10 cm will be very challenging.

QUESITI BUSTA 48

- Il candidato illustri la propria pubblicazione n.7
- Il candidato descriva una possibile applicazione del programma Powerpoint
- Il candidato legga e traduca il seguente testo in lingua inglese:

The HL-LHC will deliver luminosities of up to $7.5 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$, and ATLAS will record data at a rate 10 times higher than in Run 2. The ability to process and analyse these data depends heavily on R&D in software and computing, to make use of resource-efficient storage solutions and opportunities that paradigm-shifting improvements like heterogeneous computing, hardware accelerators and artificial intelligence can bring.



QUESITI BUSTA 49

- Il candidato illustri la propria pubblicazione n.6
- Il candidato descriva quale è l'unità di misura del contenuto di informazione
- Il candidato legga e traduca il seguente testo in lingua inglese:

The Phase-II upgrade projects described are only possible through collaborative efforts between universities and laboratories across the world. The research teams are currently working intensely to finalise the designs, establish the assembly and testing procedures, and in some cases start construction. They will all be installed and commissioned during LS3 in time for the start of Run 4, currently planned for 2029.

QUESITI BUSTA 50

- Il candidato illustri la propria pubblicazione n.9
- Il candidato descriva a cosa serve un browser
- Il candidato legga e traduca il seguente testo in lingua inglese:

The High-Luminosity LHC (HL-LHC), due to start operations in 2029, will deliver about 10 times more data than has been accumulated during the previous LHC runs. The CMS collaboration is getting ready to profit from sub-percent precision on many Standard Model (SM) processes and to probe physics beyond the SM, both directly and through studies of higher-order effective operators.

QUESITI BUSTA 51

- Il candidato illustri la propria pubblicazione n.3
- Il candidato indichi quali sono i browser più comuni
- Il candidato legga e traduca il seguente testo in lingua inglese:

To exploit the HL-LHC physics potential, the CMS collaboration is building an optimised detector that pushes technologies to new heights. This major "Phase II" upgrade will enable the subdetectors to sustain the increased luminosity, which results in greater radiation damage and higher particle rates – the innermost pixel layer, for example, will see three billion hits per second per square centimetre.

QUESITI BUSTA 52

- Il candidato illustri la propria pubblicazione n.10
- Il candidato descriva a serve un server
- Il candidato legga e traduca il seguente testo in lingua inglese:

The key to achieving the necessary HL-LHC performance is to enhance the granularity of the detector significantly. This reduces the maximum occupancy per readout cell while considerably increasing the readout bandwidth and processing power of the trigger system, thereby fully exploiting the higher collision rates.

QUESITI BUSTA 53

- Il candidato illustri la propria pubblicazione n.1
- Il candidato descriva a cosa serve un modem
- Il candidato legga e traduca il seguente testo in lingua inglese:

For the luminosity measurement, CMS is following a strategy analogous to the one for the trigger, exploiting data from various subdetectors with the ambitious goal of 1% offline (2% online) uncertainty. Achieving this precision requires an understanding of the detector systematic effects, such as linearity and stability, at the per-mille level.

QUESITI BUSTA 54

- Il candidato illustri la propria pubblicazione n.4
- Il candidato indichi i modi più comuni di trasmissione di virus informatici
- Il candidato legga e traduca il seguente testo in lingua inglese:

The CMS Phase-II upgrade is a multi-faceted project involving more than 2000 scientists, students and engineers from institutes and industrial companies in more than 50 countries. Initially discussed prior to the first LHC operation and defined by the CMS technical proposal in 2015, the CMS Phase II upgrade together with upgrades to the other LHC detectors will ensure that maximal physics is extracted under the challenging conditions of the HL-LHC.

QUESITI BUSTA 55

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva a cosa serve un database
- Il candidato legga e traduca il seguente testo in lingua inglese:

A central mystery of particle physics is why the 12 elementary quarks and leptons are arranged in pairs across three generations, identical in all but mass. Lepton flavour universality (LFU) states that the SM gauge bosons are indifferent to which generation a charged lepton belongs, implying that certain decays of hadrons involving leptons from different generations should occur at the same rates.

QUESITI BUSTA 56

- Il candidato illustri la propria pubblicazione n.5
- Il candidato descriva cosa è e come viene generato un file pdf
- Il candidato legga e traduca il seguente testo in lingua inglese:

The start of LHC Run 3 in 2022 marked an important milestone for CERN: the first step into the High-Luminosity LHC (HL-LHC) era. Thanks to a significant upgrade of the LHC injectors, the Run 3 proton beams are more intense than ever. Together with the raised centre-of-mass collision energy from 13 to 13.6 TeV, Run 3 offers a rich physics programme involving the collisions of both proton and heavy-ion beams.

QUESITI BUSTA 57

- Il candidato illustri la propria pubblicazione n.7
- Il candidato descriva quale è l'utilità di convertire un file pdf
- Il candidato legga e traduca il seguente testo in lingua inglese:

When the LHC works as a heavy-ion collider, many specific challenges need to be faced. Magnetically, the machine behaves in a similar way as during proton-proton operation. However, since the lead-ion bunch charge is about 15 times lower than for protons, a number of typical machine challenges – such as beam-beam interactions, impedance, electron-cloud effects, injection and beam-dump protection – are relaxed.

QUESITI BUSTA 58

- Il candidato illustri la propria pubblicazione n.2
- Il candidato descriva i principi alla base della sicurezza informatica
- Il candidato legga e traduca il seguente testo in lingua inglese:

The ion-collimation limitation is a well-known concern for the LHC. Nevertheless, the standard system has performed quite well so far and provided adequate cleaning efficiency for the nominal LHC ion-beam parameters. But the HL-LHC targets pose additional challenges. In particular, the upgrade does not allow sufficient operational margins without improving the betatron collimation cleaning.

QUESITI BUSTA 59

- Il candidato illustri la propria pubblicazione n.5
- Il candidato descriva quale è l'unità di misura della velocità di un processore
- Il candidato legga e traduca il seguente testo in lingua inglese:

The development of crystal applications with hadron beams at CERN dates back to the activities carried out by the UA9 collaboration at the CERN SPS. Crystal collimation makes use of a phenomenon called planar channelling: charged particles impinging on a pure crystal with well-defined impact conditions can remain trapped in the electromagnetic potential well generated by the regular planes of atoms.

QUESITI BUSTA 60

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva quali sono le unità periferiche di un computer
- Il candidato legga e traduca il seguente testo in lingua inglese:

At the LHC, a total of four bent crystals are needed for the horizontal and vertical collimation of both beams. During Run 2, a test stand for crystal-collimation tests was installed in the LHC betatron cleaning region of IR7 with the aim of demonstrating the feasibility of this advanced collimation technique at LHC energies.

QUESITI BUSTA 61

- Il candidato illustri la propria pubblicazione n.8
- Il candidato descriva quali sono le unità periferiche di input
- Il candidato legga e traduca il seguente testo in lingua inglese:

The crystal collimators are steered remotely using a technology that is unique to the CERN accelerator complex. It relies on a high-precision interferometer that provides suitable feedback to the advanced controller, and a precise piezo-actuation device that drives the crystal orientation with respect to impinging halo particles with unprecedented precision.

QUESITI BUSTA 62

- Il candidato illustri la propria pubblicazione n.9
- Il candidato descriva quali sono le unità periferiche di output
- Il candidato legga e traduca il seguente testo in lingua inglese:

The LHC collimation system is the most complex beam-cleaning system built to date for particle accelerators. However, it must be further improved to successfully face the upcoming challenges from the HL-LHC upgrade which, for heavy-ion beams, begins during Run 3. Crystal collimation is a crucial upgrade that is now being put into operation to improve the betatron cleaning in preparation for the upgraded ion-beam parameters, mitigating the risks of machine downtime from ion-beam losses.

QUESITI BUSTA 63

- Il candidato illustri la propria pubblicazione n.7
- Il candidato descriva a cosa serve il backup
- Il candidato legga e traduca il seguente testo in lingua inglese:

China's Institute of High Energy Physics (IHEP) is seeing strategic and operational benefits from its long-term investment to establish – at scale – an internationally recognised centre-of-excellence for accelerator research and technology development. Yifang Wang and Yuhui Li provide the inside story plus a status update on design studies for the proposed Circular Electron–Positron Collider (CEPC).

QUESITI BUSTA 64

- Il candidato illustri la propria pubblicazione n.6
- Il candidato descriva cosa è il sistema operativo di un pc e faccia qualche esempio
- Il candidato legga e traduca il seguente testo in lingua inglese:

The FCC-ee, a proposed 91 km future circular collider at CERN foreseen to begin operations in the 2040s, would deliver enormous samples of collision data at a wide range of energies, allowing for ultra-precise studies of the Higgs, W and Z bosons, and the top quark. For example, when running at the Z resonance the FCC-ee will produce – in little more than one minute – a data set the same size as that the LEP collider accumulated in the 1990s during its entire period of operation.

QUESITI BUSTA 65

- Il candidato illustri la propria pubblicazione n.9
- Il candidato descriva a cosa serve il wi-fi
- Il candidato legga e traduca il seguente testo in lingua inglese:

The collision-energy calibration is a central consideration in the design and proposed operation strategy of the FCC-ee, in contrast to LEP where it was essentially an afterthought. At LEP, resonant depolarisation measurements were performed in dedicated calibration periods a few times per year. At FCC-ee these measurements will take place continually.

QUESITI BUSTA 66

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva come si può modificare un file pdf
- Il candidato legga e traduca il seguente testo in lingua inglese:

After five years of arduous and continuous activity, the main civil-engineering works for the High-Luminosity LHC project (HL-LHC) are on track to be completed by the end of the year. Approved in June 2016 and due to enter operation in 2029, the HL-LHC is a major upgrade that will extend the LHC's discovery potential significantly.

QUESITI BUSTA 67

- Il candidato illustri la propria pubblicazione n.10
- Il candidato indichi quale è il significato dell'acronimo "PEC"
- Il candidato legga e traduca il seguente testo in lingua inglese:

A multidisciplinary team in the UK has received seed funding to investigate the feasibility of a new facility for ion-therapy research based on novel accelerator, instrumentation and computing technologies. At the core of the facility would be a laser-hybrid accelerator dubbed LhARA: a high-power pulsed laser striking a thin foil target would create a large flux of protons or ions, which are captured using strong-focusing electron-plasma lenses and then accelerated rapidly in a fixed-field alternating-gradient accelerator.

QUESITI BUSTA 68

- Il candidato illustri la propria pubblicazione n.1
- Il candidato indichi quale è la combinazione di tasti per "Copia e Incolla"
- Il candidato legga e traduca il seguente testo in lingua inglese:

High-energy X-rays are by far the most common radiotherapy tool, but recent decades have seen a growth in particle-beam radiotherapy. In contrast to X-rays, protons and ion beams can be manipulated to deliver radiation doses more precisely than conventional radiotherapy, sparing surrounding healthy tissue.

QUESITI BUSTA 69

- Il candidato illustri la propria pubblicazione n.4
- Il candidato descriva cosa è la videoscrittura e come si realizza
- Il candidato legga e traduca il seguente testo in lingua inglese:

A small number of laboratories in Europe already work on laser-driven sources for biomedical applications. The LhARA collaboration, which comprises physicists, biologists, clinicians and engineers, aims to build on this work to demonstrate the feasibility of capturing and manipulating the flux created in the laser-target interaction to provide a beam that can be accelerated rapidly to the desired energy.

QUESITI BUSTA 70

- Il candidato illustri la propria pubblicazione n.3
- Il candidato indichi cosa è una presentazione multimediale e come si realizza
- Il candidato legga e traduca il seguente testo in lingua inglese:

Tens of thousands of accelerators around the world help create radiopharmaceuticals, treat cancer, preserve food, monitor the environment, strengthen materials, understand fundamental physics, study the past, and even disclose crimes.

QUESITI BUSTA 71

- Il candidato illustri la propria pubblicazione n.5
- Il candidato descriva come si può realizzare un grafico al computer
- Il candidato legga e traduca il seguente testo in lingua inglese:

The role of accelerators in preserving cultural heritage objects and in detecting forgeries is becoming more vital, especially in countries that do not have the required capabilities. Ion-beam analysis and accelerator mass spectrometry techniques are of particular relevance

QUESITI BUSTA 72

- Il candidato illustri la propria pubblicazione n.7
- Il candidato descriva come si può costruire una tabella al computer
- Il candidato legga e traduca il seguente testo in lingua inglese:

The operation of the LHC's cryogenic system was initiated in 2008 after reception testing and a first cool down to 1.9 K. This webinar will cover information on the design, operational experiences and main challenges linked to the accelerator, along with the physics requirements.



QUESITI BUSTA 73

- Il candidato illustri la propria pubblicazione n.2
- Il candidato descriva come si possono proteggere i dati da attacchi esterni
- Il candidato legga e traduca il seguente testo in lingua inglese:

At 4.47 p.m. on Tuesday 5 July, applause broke out in the CERN Control Centre as LHC operators declared Stable Beams. After more than three years of upgrade and maintenance work across the machine and experiments, ALICE, ATLAS, CMS and LHCb started recording their first proton–proton collisions at an unprecedented energy of 13.6 TeV.

QUESITI BUSTA 74

- Il candidato illustri la propria pubblicazione n.5
- Il candidato indichi alcuni esempi di piattaforme per videoconferenze
- Il candidato legga e traduca il seguente testo in lingua inglese:

The FCC study is exploring the technical and financial feasibility of a 91 km-circumference collider situated under French and Swiss territory near CERN, thus exploiting existing infrastructures. In a first phase (FCC-ee) the tunnel would host an electron–positron collider at energies from 90 to 365 GeV

QUESITI BUSTA 75

- Il candidato illustri la propria pubblicazione n.3
- Il candidato descriva cosa indicano cc e bcc nell'applicativo mail
- Il candidato legga e traduca il seguente testo in lingua inglese:

INFN is already well integrated both in the FCC coordination structure and several ongoing studies, having participated in the project since its beginning, and provides important contributions on all aspects of the FCC study. These range from accelerator and detector R&D, such as the development of superconducting magnets, to experimental and theoretical physics studies.

