









ALLEGATO 2a)

Ambiti di ricerca definiti dall'European Research Council

LIVELLO 1	Livello 2	Livello 3	
PHYSICAL SCIENCES AND ENGINEERING	Livello 2 PE1 Mathematics All areas of mathematics, pure and applied, plus mathematical foundations of computer science, mathematical physics and statistics	PE1_1 PE1_2 PE1_3 PE1_4 PE1_5 PE1_6 PE1_7 PE1_8 PE1_9 PE1_10 PE1_11 PE1_12 PE1_13 PE1_14 PE1_15 PE1_16 PE1_17 PE1_18 PE1_16 PE1_17 PE1_18 PE1_19 PE1_20 PE1_21	Logic and foundations Algebra Number theory Algebraic and complex geometry Lie groups, Lie algebras Geometry and global analysis Topology Analysis Operator algebras and functional analysis ODE and dynamical systems Theoretical aspects of partial differential equations Mathematical physics Probability Mathematical statistics Generic statistical methodology and modelling Discrete mathematics and combinatorics Mathematical aspects of computer science Numerical analysis Scientific computing and data processing Control theory, optimisation and operational research Application of mathematics in sciences
	PE2 Fundamental Constituents of Matter Particle, nuclear, plasma, atomic, molecular, gas, and optical physics	PE1_22 PE2_1 PE2_2 PE2_3 PE2_4 PE2_5 PE2_6 PE2_7 PE2_8 PE2_9 PE2_10 PE2_11 PE2_12 PE2_13 PE2_14 PE2_15 PE2_14 PE2_15 PE2_16	Theory of fundamental interactions Phenomenology of fundamental interactions Experimental particle physics with accelerators Experimental particle physics without accelerators Classical and quantum physics of gravitational interactions Nuclear, hadron and heavy ion physics Nuclear and particle astrophysics Gas and plasma physics Electromagnetism Atomic, molecular physics Ultra-cold atoms and molecules Optics, non-linear optics and nano-optics Quantum optics and quantum information Lasers, ultra-short lasers and laser physics Thermodynamics Non-linear physics Metrology and measurement Equilibrium and non-equilibrium statistical mechanics: steady states and dynamics
	PE3 Condensed Matter Physics Structure, electronic properties, fluids, nanosciences, biological physics	PE3_1 PE3_2 PE3_3 PE3_4 PE3_5 PE3_6 PE3_7 PE3_8 PE3_9 PE3_10 PE3_11	Structure of solids, material growth and characterisation Mechanical and acoustical properties of condensed matter, lattice dynamics Transport properties of condensed matter Electronic properties of materials, surfaces, interfaces, nanostructures Physical properties of semiconductors and insulators Macroscopic quantum phenomena, e.g. superconductivity, superfluidity, quantum Hall effect Spintronics Magnetism and strongly correlated systems Condensed matter – beam interactions (photons, electrons, etc.) Nanophysics, e.g. nanoelectronics, nanophotonics, nanomagnetism, nanoelectromechanics Mesoscopic quantum physics and solid-state quantum

PE3 12 Melicular electronics PE3 13 Structure and dynamics of diordered systems, e.g., soft matter PE3 15 Haid dynamics (physics) PE3 15 Structure and dynamics of diordered systems, e.g., soft matter PE3 15 Haid dynamics (physics) PE3 15 Statistical physics phase transitions, condensed matter systems, medics of complex systems, interdisciplinary applications PE3 15 Physical chemistry PE3 15 Statistical physics: PE3 16 Physical physics: PE3 16 Physical physics: PE4 17 Short of the biological systems of the biological systems of the physics PE4 18 Physical chemistry PE4 18 PE4 12 PE4 18 PE4 1	LIVELLO 1	Livello 2	Livello 3	
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PE6_12 Scientific computing, simulation and modelling tools	ı		_	
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L PED 13 BIOINTORMATICS, DIO-INSDIRED COMBUTINE, AND NATURAL COMBUTING			PE6_13	Bioinformatics, bio-inspired computing, and natural computing

LIVELLO 1	Livello 2	Livello 3	
		PE6_14	Quantum computing (formal methods, algorithms and other computer science aspects)
	PE7 Systems and	PE7_1	Control engineering
	Communication Engineering	PE7_2	Electrical engineering: power components and/or systems
	Electrical, electronic, communication,	PE7_3	Simulation engineering and modelling
	optical and systems engineering	PE7_4	(Micro- and nano-) systems engineering
		PE7_5	(Micro- and nano-) electronic, optoelectronic and photonic
		PE7_6	components Communication systems, wireless technology, high-frequency technology
		PE7_7	Signal processing
		PE7_8 PE7_9	Networks, e.g. communication networks and nodes, Internet of Things, sensor networks, networks of robots Man-machine interfaces
		PE7_10	Robotics
		PE7_11	Components and systems for applications (in e.g. medicine, biology, environment)
	250	PE7_12	Electrical energy production, distribution, applications
	PE8 Products and Processes Engineering	PE8_1 PE8_2	Aerospace engineering Chemical engineering, technical chemistry
	Product and process design,	PE8_3	Civil engineering, architecture, offshore construction, lightweight
	chemical, civil, environmental,	_	construction, geotechnics
	mechanical, vehicle engineering,	PE8_4	Computational engineering
	energy processes and relevant	PE8_5	Fluid mechanics
	computational methods	PE8_6 PE8_7	Energy processes engineering Mechanical engineering
		PE8_8	Propulsion engineering, e.g. hydraulic, turbo, piston, hybrid
		_	engines
		PE8_9	Production technology, process engineering
		PE8_10	Manufacturing engineering and industrial design
		PE8_11	Environmental engineering, e.g. sustainable design, waste and water treatment, recycling, regeneration or recovery of
			compounds, carbon capture & storage
		PE8_12	Naval/marine engineering
		PE8_13	Industrial bioengineering
		PE8_14	Automotive and rail engineering; multi-/inter-modal transport
	PE9 Universe Sciences	PE9 1	engineering Solar physics – the Sun and the heliosphere
	Astro-physics/-chemistry/-biology;	PE9 2	Solar system science
	solar system; planetary systems;	PE9_3	Exoplanetary science, formation and characterization of
	stellar, galactic and extragalactic astronomy; cosmology; space	DEO 4	extrasolar planets Astrobiology
	sciences; astronomical	PE9_4 PE9_5	Interstellar medium and star formation
	instrumentation and data	PE9_6	Stars – stellar physics, stellar systems
		PE9_7	The Milky Way
		PE9_8	Galaxies – formation, evolution, clusters
		PE9_9	Cosmology and large-scale structure, dark matter, dark energy
		PE9_10	Relativistic astrophysics and compact objects
		PE9_11	Gravitational wave astronomy
		PE9_12 PE9_13	High-energy and particle astronomy Astronomical instrumentation and data, or a telescopes
		L F 3 _ 13	Astronomical instrumentation and data, e.g. telescopes, detectors, techniques, archives, analyses
	PE10 Earth System Science	PE10_1	Atmospheric chemistry, atmospheric composition, air pollution
	Physical geography, geology,	PE10_2	Meteorology, atmospheric physics and dynamics
	geophysics, atmospheric sciences,	PE10_3	Climatology and climate change
	oceanography, climatology, cryology,	PE10_4	Terrestrial ecology, land cover change
	ecology, global environmental	PE10_5	Geology, tectonics, volcanology
	change, biogeochemical cycles, natural resources management	PE10_6 PE10_7	Palaeoclimatology, palaeoecology Physics of earth's interior, seismology, geodynamics
	natarar resources management	PE10_8	Oceanography (physical, chemical, biological, geological)
		PE10_9	Biogeochemistry, biogeochemical cycles, environmental chemistry
		PE10_10 PE10_11	Mineralogy, petrology, igneous petrology, metamorphic petrology Geochemistry, cosmochemistry, crystal chemistry, isotope
		PE10_12	geochemistry, thermodynamics Sedimentology, soil science, palaeontology, earth evolution
		PE10_12 PE10_13	Physical geography, geomorphology
		PE10_14	Earth observations from space/remote sensing
		PE10_15	Geomagnetism, palaeomagnetism
		PE10_16	Ozone, upper atmosphere, ionosphere

LIVELLO 1	Livello 2	Livello 3	
		PE10_17	Hydrology, hydrogeology, engineering and environmental geology, water and soil pollution
		PE10_18	Cryosphere, dynamics of snow and ice cover, sea ice, permafrost: and ice sheets
		PE10_19	Planetary geology and geophysics
		PE10_20	Geohazards
		PE10_21	Earth system modelling and interactions
	PE11 Materials Engineering Advanced materials development:	PE11_1	Engineering of biomaterials, biomimetic, bioinspired and bioenabled materials
	performance enhancement,	PE11_2	Engineering of metals and alloys
	modelling, large-scale preparation, modification, tailoring, optimisation,	PE11_3 PE11_4	Engineering of ceramics and glasses Engineering of polymers and plastics
	novel and combined use of materials,	PE11_4 PE11_5	Engineering of composites and hybrid materials
	etc.	PE11_6	Engineering of carbon materials
		PE11_7	Engineering of metal oxides
		PE11_8 PE11_9	Engineering of alternative established or emergent materials Nanomaterials engineering, e.g. nanoparticles, nanoporous
			materials, 1D & 2D nanomaterials
		PE11_10 PE11_11	Soft materials engineering, e.g. gels, foams, colloids Porous materials engineering, e.g. covalent-organic, metal-
		2544 42	organic, porous aromatic frameworks
		PE11_12 PE11_13	Semi-conducting and magnetic materials engineering Metamaterials engineering
		PE11_14	Computational methods for materials engineering
LIFE SCIENCES	LS1 Molecules of Life:	LS1_1	Macromolecular complexes including interactions involving
	Biological Mechanisms, Structures	101 2	nucleic acids, proteins, lipids and carbohydrates
	and Functions For all organisms:	LS1_2 LS1_3	Biochemistry DNA and RNA biology
	Molecular biology, biochemistry,	LS1_4	Protein biology
	structural biology, molecular	LS1_5	Lipid biology
	biophysics, synthetic and chemical	LS1_6	Glycobiology
	biology, drug design, innovative methods and modelling	LS1_7	Molecular biophysics, biomechanics, bioenergetics Structural biology
	methous and modelling	LS1_8 LS1_9	Molecular mechanisms of signalling processes
		LS1_10	Synthetic biology
		LS1_11	Chemical biology
		LS1_12	Protein design
		LS1_13 LS1_14	Early translational research and drug design Innovative methods and modelling in molecular, structural and
		231_11	synthetic biology
	LS2 Integrative Biology:	LS2_1	Genetics
	from Genes and Genomes to Systems	LS2_2 LS2_3	Gene editing Epigenetics
	For all organisms:	LS2_3 LS2_4	Gene regulation
	Genetics, epigenetics, genomics and	LS2_5	Genomics
	other 'omics studies, bioinformatics,	LS2_6	Metagenomics
	systems biology, genetic diseases, gene editing, innovative methods and	LS2_7 LS2_8	Transcriptomics Proteomics
	modelling, 'omics for personalised	LS2_8 LS2_9	Metabolomics
	medicine	LS2_10	Glycomics/Lipidomics
		LS2_11	Bioinformatics and computational biology
		LS2_12	Biostatistics
		LS2_13 LS2_14	Systems biology Genetic diseases
		LS2_14 LS2_15	Integrative biology for personalised medicine
		LS2_16	Innovative methods and modelling in integrative biology
	LS3 Cellular, Developmental	LS3_1	Cell cycle, cell division and growth
	and Regenerative Biology For all organisms:	LS3_2 LS3_3	Cell senescence, cell death, autophagy, cell ageing Cell behaviour, including control of cell shape, cell migration
	Structure and function of the cell,	LS3_4	Cell junctions, cell adhesion, the extracellular matrix, cell
	cell-cell communication,		communication
	embryogenesis, tissue differentiation,	LS3_5	Cell signalling and signal transduction, exosome biology
	organogenesis, growth, development, evolution of development, organoids,	LS3_6	Organelle biology and trafficking Mechanobiology of cells, tissues and organs
	stem cells, regeneration, therapeutic	LS3_7 LS3_8	Embryogenesis, pattern formation, morphogenesis
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LIVELLO 1	Livello 2	Livello 3	
	approaches	LS3_10 LS3_11 LS3_12 LS3_13 LS3_14 LS3_15 LS3_16 LS3_17	Developmental genetics Evolution of developmental strategies Organoids Stem cells Regeneration Development of cell-based therapeutic approaches for tissue regeneration Functional imaging of cells and tissues Theoretical modelling in cellular, developmental and regenerative biology
	LS4 Physiology in Health, Disease and Ageing Organ and tissue physiology, comparative physiology, physiology of ageing, pathophysiology, inter- organ and tissue communication, endocrinology, nutrition, metabolism, interaction with the microbiome, non-communicable diseases including cancer (and except disorders of the nervous system and immunity-related diseases)	LS4_1 LS4_2 LS4_3 LS4_4 LS4_5 LS4_6 LS4_7 LS4_8 LS4_9 LS4_10 LS4_11 LS4_11 LS4_12 LS4_13	Organ and tissue physiology and pathophysiology Comparative physiology Physiology of ageing Endocrinology Non-hormonal mechanisms of inter-organ and tissue communication Microbiome and host physiology Nutrition and exercise physiology Impact of stress (including environmental stress) on physiology Metabolism and metabolic disorders, including diabetes and obesity The cardiovascular system and cardiovascular diseases Haematopoiesis and blood diseases Cancer Other non-communicable diseases (except disorders of the nervous system and immunity-related diseases)
	LS5 Neuroscience and Disorders of the Nervous System Nervous system development, homeostasis and ageing, nervous system function and dysfunction, systems neuroscience and modelling, biological basis of cognitive processes and of behaviour, neurological and mental disorders	LS5_1 LS5_2 LS5_3 LS5_4 LS5_5 LS5_6 LS5_7 LS5_8 LS5_9 LS5_10 LS5_11 LS5_12 LS5_13 LS5_14 LS5_15 LS5_16 LS5_17	Neuronal cells Glial cells and neuronal-glial communication Neural development and related disorders Neural stem cells Neural networks and plasticity Neurovascular biology and blood-brain barrier Sensory systems, sensation and perception, including pain Neural basis of behaviour Neural basis of cognition Ageing of the nervous system Neurological and neurodegenerative disorders Mental disorders Nervous system injuries and trauma, stroke Repair and regeneration of the nervous system Neuroimmunology, neuroinflammation Systems and computational neuroscience Imaging in neuroscience Innovative methods and tools for neuroscience
	LS6 Immunity, Infection and Immunotherapy The immune system, related disorders and their mechanisms, biology of infectious agents and infection, biological basis of prevention and treatment of infectious diseases, innovative immunological tools and approaches, including therapies	LS6_1 LS6_2 LS6_3 LS6_4 LS6_5 LS6_6 LS6_7 LS6_8 LS6_9 LS6_10 LS6_11	Innate immunity Adaptive immunity Regulation of the immune response Immune-related diseases Biology of pathogens (e.g. bacteria, viruses, parasites, fungi) Infectious diseases Mechanisms of infection Biological basis of prevention and treatment of infection Antimicrobials, antimicrobial resistance Vaccine development Innovative immunological tools and approaches, including therapies
	LS7 Prevention, Diagnosis and Treatment of Human Diseases Medical technologies and tools for prevention, diagnosis and treatment of human diseases, therapeutic approaches and interventions, pharmacology, preventative medicine, epidemiology and public	LS7_1 LS7_2 LS7_3 LS7_4 LS7_5 LS7_6	Medical imaging for prevention, diagnosis and monitoring of diseases Medical technologies and tools (including genetic tools and biomarkers) for prevention, diagnosis, monitoring and treatment of diseases Nanomedicine Regenerative medicine Applied gene, cell and immune therapies Other medical therapeutic interventions, including transplantation

LIVELLO 1	Livello 2	Livello 3	
	health, digital medicine	LS7_7	Pharmacology and toxicology
	_	LS7_8	Effectiveness of interventions, including resistance to therapies
		LS7_9	Public health and epidemiology
		LS7_10	Preventative and prognostic medicine
		LS7_11	Environmental health, occupational medicine
		LS7_12	Health care, including care for the ageing population
		LS7_13	Palliative medicine
		LS7_14	Digital medicine, e-medicine, medical applications of artificial
			intelligence
		LS7_15	Medical ethics
	LS8 Environmental Biology,	LS8_1	Ecosystem and community ecology, macroecology
	Ecology and Evolution	LS8_2	Biodiversity
	For all organisms:	LS8 3	Conservation biology
	Ecology, biodiversity, environmental	LS8_4	Population biology, population dynamics, population genetics
	change, evolutionary biology,	LS8_5	Biological aspects of environmental change, including climate
	behavioural ecology, microbial	_	change
	ecology, marine biology,	LS8_6	Evolutionary ecology
	ecophysiology, theoretical	LS8_7	Evolutionary genetics
	developments and modelling	LS8_8	Phylogenetics, systematics, comparative biology
		LS8_9	Macroevolution and paleobiology
		LS8_10	Ecology and evolution of species interactions
		LS8_11	Behavioural ecology and evolution
		LS8_11	Microbial ecology and evolution
		LS8_12 LS8_13	Marine biology and ecology
		LS8_13	Ecophysiology, from organisms to ecosystems
		LS8_15	Theoretical developments and modelling in environmental
		136_13	biology, ecology, and evolution
	LS9 Biotechnology and	100 1	Discontinuous for sunthesis and showing higher
		LS9_1	Bioengineering for synthetic and chemical biology
	Biosystems Engineering	LS9_2	Applied genetics, gene editing and transgenic organisms
	Biotechnology using all organisms,	LS9_3	Bioengineering of cells, tissues, organs and organisms
	biotechnology for environment and	LS9_4	Microbial biotechnology and bioengineering
	food applications, applied plant and	LS9_5	Food biotechnology and bioengineering
	animal sciences, bioengineering and	LS9_6	Marine biotechnology and bioengineering
	synthetic biology, biomass and	LS9_7	Environmental biotechnology and bioengineering
	biofuels, biohazards	LS9_8	Applied plant sciences, plant breeding, agroecology and soil biology
		LS9_9	Plant pathology and pest resistance
		LS9_10	Veterinary and applied animal sciences
		LS9 11	Biomass production and utilisation, biofuels
		LS9_12	Ecotoxicology, biohazards and biosafety
SOCIAL SCIENCES AND HUMANITIES	SH1 Individuals, Markets and Organisations	SH1_1 SH1_2	Macroeconomics; monetary economics; economic growth International trade; international management; international
AND HUIVIAINITIES	Economics, finance, management	3П1_2	
	Economics, infance, management	CU1 2	business; spatial economics
		SH1_3	Development economics; structural change; political economy of
		CU1 /	development
		SH1_4	Finance; asset pricing; international finance; market
		SH1_5	microstructure Corporate finance; banking and financial intermediation;
			accounting; auditing; insurance
		SH1_6	Econometrics; operations research
		SH1_7	Behavioural economics; experimental economics; neuro-
		_	economics
		SH1_8	Microeconomic theory; game theory; decision theory
		SH1_9	Industrial organisation; entrepreneurship; R&D and innovation
		SH1_10	Management; strategy; organisational behaviour
		SH1_11	Human resource management; operations management,
		5	marketing
		SH1_12	Environmental economics; resource and energy economics;
		3111_12	·
		1	agricultural economics
		CU4 43	
		SH1_13	Labour and demographic economics
		SH1_14	Health economics; economics of education
		SH1_14 SH1_15	Health economics; economics of education Public economics; political economics; law and economics
		SH1_14	Health economics; economics of education

LIVELLO 1	Livello 2	Livello 3	
	SH2 Institutions,	SH2 1	Political systems, governance
	Governance and Legal Systems	SH2_2	Democratisation and social movements
	Political science, international	SH2_3	Conflict resolution, war, peace building, international law
	relations, law	SH2_4	Legal studies, constitutions, human rights, comparative law
		SH2_5	International relations, global and transnational governance
		SH2 6	Humanitarian assistance and development
		SH2_7	Political and legal philosophy
		SH2_8	Big data in political and legal studies
	SH3 The Social World and Its	SH3_1	Social structure, social mobility, social innovation
	Diversity	SH3_2	Inequalities, discrimination, prejudice
	Sociology, social psychology, social	SH3_3	Aggression and violence, antisocial behaviour, crime
	anthropology, education sciences,	SH3_4	Social integration, exclusion, prosocial behaviour
	communication studies	SH3_5	Attitudes and beliefs
		SH3_6	Social influence; power and group behaviour
		SH3_7	Kinship; diversity and identities, gender, interethnic relations
		SH3_8	Social policies, welfare, work and employment
		SH3_9	Poverty and poverty alleviation
		SH3_10	Religious studies, ritual; symbolic representation
		SH3_11	Social aspects of teaching and learning, curriculum studies,
			education and educational policies
		SH3_12	Communication and information, networks, media
		SH3_13	Digital social research
		SH3_14	Social studies of science and technology
	SH4 The Human Mind and	SH4_1	Cognitive basis of human development and education,
	Its Complexity Cognitive science, psychology	CH4 2	developmental disorders; comparative cognition
	Cognitive science, psychology,	SH4_2	Personality and social cognition; emotion
	linguistics, theoretical philosophy	SH4_3	Clinical and health psychology
		SH4_4 SH4_5	Neuropsychology Attention persention action consciousness
		_	Attention, perception, action, consciousness
		SH4_6 SH4_7	Learning, memory; cognition in ageing Reasoning, decision-making; intelligence
		SH4_8	Language learning and processing (first and second languages)
		SH4_9	Theoretical linguistics; computational linguistics
		SH4_10	Language typology; historical linguistics
		SH4_11	Pragmatics, sociolinguistics, linguistic anthropology, discourse analysis
		SH4_12 SH4_13	Philosophy of mind, philosophy of language Philosophy of science, epistemology, logic
	CUE Characteristic hard	_	
	SH5 Cultures and Cultural Production	SH5_1	Classics, ancient literature and art
		SH5_2	Theory and history of literature, comparative literature
	Literary studies, cultural studies,	SH5_3	Philology; text and image studies Visual and performing arts, film, design and architecture
	study of the arts, philosophy	SH5_4 SH5_5	Visual and performing arts, film, design and architecture Music and musicology; history of music
		SH5_5 SH5_6	History of art and architecture, arts-based research
		SH5_7	Museums, exhibitions, conservation and restoration
		SH5_8	Cultural studies, cultural identities and memories, cultural heritage
		SH5_9	Metaphysics, philosophical anthropology; aesthetics
		SH5_10	Ethics and its applications; social philosophy
		SH5_11	History of philosophy
		SH5_12	Computational modelling and digitisation in the cultural sphere
	SH6 The Study of the Human Past	SH6_1	Historiography, theory and methods in history, including the analysis of digital data
	Archaeology and history	SH6_2	Classical archaeology, history of archaeology, social archaeology
		SH6_3	General archaeology, archaeometry, landscape archaeology
		SH6_4	Prehistory, palaeoanthropology, palaeodemography, protohistory, bioarchaeology
		SH6_5	Palaeography and codicology
		SH6_6	Ancient history
		SH6_7	Medieval history
		SH6_8	Early modern history
		SH6_9	Modern and contemporary history
		SH6_10	Colonial and post-colonial history
		SH6_11	Global history, transnational history, comparative history,
		55_11	entangled histories
		SH6_12	Social and economic history
	1	2110_12	Social and Economic history

LIVELLO 1	Livello 2	Livello 3	
		SH6_13 SH6_14 SH6_15	Gender history, cultural history, history of collective identities and memories, history of religions SCO+ History of ideas, intellectual history, history of economic thought History of science, medicine and technologies
	SH7 Human Mobility, Environment, and Space Human geography, demography, health, sustainability science, territorial planning, spatial analysis	SH7_1 SH7_2 SH7_3 SH7_4 SH7_5 SH7_6	Human, economic and social geography Migration Population dynamics: households, family and fertility Social aspects of health, ageing and society Sustainability sciences, environment and resources Environmental and climate change, societal impact and policy