

## ERC EVALUATION PANELS AND KEYWORDS

### PE - Physical Sciences and Engineering

#### PE1 Mathematics

All areas of mathematics, pure and applied, plus mathematical foundations of computer science, mathematical physics and statistics

- PE1\_1 Logic and foundations
- PE1\_2 Algebra
- PE1\_3 Number theory
- PE1\_4 Algebraic and complex geometry
- PE1\_5 Lie groups, Lie algebras
- PE1\_6 Geometry and Global Analysis
- PE1\_7 Topology
- PE1\_8 Analysis
- PE1\_9 Operator algebras and functional analysis
- PE1\_10 ODE and dynamical systems
- PE1\_11 Theoretical aspects of partial differential equations
- PE1\_12 Mathematical physics
- PE1\_13 Probability
- PE1\_14 Statistics
- PE1\_15 Discrete mathematics and combinatorics
- PE1\_16 Mathematical aspects of computer science
- PE1\_17 Numerical analysis
- PE1\_18 Scientific computing and data processing
- PE1\_19 Control theory and optimisation
- PE1\_20 Application of mathematics in sciences
- PE1\_21 Application of mathematics in industry and society

#### PE2 Fundamental Constituents of Matter

Particle, nuclear, plasma, atomic, molecular, gas, and optical physics

- PE2\_1 Fundamental interactions and fields
- PE2\_2 Particle physics
- PE2\_3 Nuclear physics
- PE2\_4 Nuclear astrophysics
- PE2\_5 Gas and plasma physics
- PE2\_6 Electromagnetism
- PE2\_7 Atomic, molecular physics
- PE2\_8 Ultra-cold atoms and molecules
- PE2\_9 Optics, non-linear optics and nano-optics
- PE2\_10 Quantum optics and quantum information
- PE2\_11 Lasers, ultra-short lasers and laser physics
- PE2\_12 Relativity
- PE2\_13 Thermodynamics
- PE2\_14 Non-linear physics
- PE2\_15 Metrology and measurement
- PE2\_16 Statistical physics (gases)

#### PE3 Condensed Matter Physics

Structure, electronic properties, fluids, nanosciences, biological physics

- PE3\_1 Structure of solids, material growth and characterisation
- PE3\_2 Mechanical and acoustical properties of condensed matter, Lattice dynamics PE3\_3 Transport properties of condensed matter
- PE3\_4 Electronic properties of materials, surfaces, interfaces, nanostructures, etc. PE3\_5 Physical properties of semiconductors and insulators

PE3\_6 Macroscopic quantum phenomena: superconductivity, superfluidity, etc. PE3\_7 Spintronics  
PE3\_8 Magnetism and strongly correlated systems  
PE3\_9 Condensed matter – beam interactions (photons, electrons, etc.)  
PE3\_10 Nanophysics: nanoelectronics, nanophotonics, nanomagnetism, nanoelectromechanics, etc.  
PE3\_11 Mesoscopic physics  
PE3\_12 Molecular electronics  
PE3\_13 Structure and dynamics of disordered systems: soft matter (gels, colloids, liquid crystals, etc.),  
liquids, glasses, defects, etc.  
PE3\_14 Fluid dynamics (physics)  
PE3\_15 Statistical physics: phase transitions, noise and fluctuations, models of complex systems, etc.  
PE3\_16 Physics of biological systems

#### **PE4 Physical and Analytical Chemical Sciences**

Analytical chemistry, chemical theory, physical chemistry/chemical physics

PE4\_1 Physical chemistry  
PE4\_2 Spectroscopic and spectrometric techniques PE4\_3 Molecular architecture and Structure  
PE4\_4 Surface science and nanostructures PE4\_5 Analytical chemistry  
PE4\_6 Chemical physics  
PE4\_7 Chemical instrumentation  
PE4\_8 Electrochemistry, electrodialysis, microfluidics, sensors PE4\_9 Method development in chemistry  
PE4\_10 Heterogeneous catalysis  
PE4\_11 Physical chemistry of biological systems  
PE4\_12 Chemical reactions: mechanisms, dynamics, kinetics and catalytic reactions  
PE4\_13 Theoretical and computational chemistry  
PE4\_14 Radiation and Nuclear chemistry  
PE4\_15 Photochemistry  
PE4\_16 Corrosion  
PE4\_17 Characterisation methods of materials  
PE4\_18 Environment chemistry

#### **PE5 Synthetic Chemistry and Materials**

Materials synthesis, structure-properties relations, functional and advanced materials, molecular architecture, organic chemistry

PE5\_1 Structural properties of materials  
PE5\_2 Solid state materials  
PE5\_3 Surface modification  
PE5\_4 Thin films  
PE5\_5 Ionic liquids  
PE5\_6 New materials: oxides, alloys, composite, organic-inorganic hybrid, nanoparticles  
PE5\_7 Biomaterials, biomaterials synthesis  
PE5\_8 Intelligent materials – self assembled materials  
PE5\_9 Coordination chemistry  
PE5\_10 Colloid chemistry  
PE5\_11 Biological chemistry  
PE5\_12 Chemistry of condensed matter  
PE5\_13 Homogeneous catalysis  
PE5\_14 Macromolecular chemistry  
PE5\_15 Polymer chemistry  
PE5\_16 Supramolecular chemistry  
PE5\_17 Organic chemistry  
PE5\_18 Medicinal chemistry

#### **PE6 Computer Science and Informatics**

Informatics and information systems, computer science, scientific computing, intelligent systems

PE6\_1 Computer architecture, pervasive computing, ubiquitous computing  
PE6\_2 Computer systems, parallel/distributed systems, sensor networks, embedded systems, cyber-physical

systems

- PE6\_3 Software engineering, operating systems, computer languages
- PE6\_4 Theoretical computer science, formal methods, and quantum computing
- PE6\_5 Cryptology, security, privacy, quantum cryptography
- PE6\_6 Algorithms, distributed, parallel and network algorithms, algorithmic game theory
- PE6\_7 Artificial intelligence, intelligent systems, multi agent systems
- PE6\_8 Computer graphics, computer vision, multi media, computer games
- PE6\_9 Human computer interaction and interface, visualisation and natural language processing
- PE6\_10 Web and information systems, database systems, information retrieval and digital libraries, data fusion
- PE6\_11 Machine learning, statistical data processing and applications using signal processing (e.g. speech, image, video)
- PE6\_12 Scientific computing, simulation and modelling tools
- PE6\_13 Bioinformatics, biocomputing, and DNA and molecular computation

### **PE7 Systems and Communication Engineering**

Electrical, electronic, communication, optical and systems engineering

- PE7\_1 Control engineering
- PE7\_2 Electrical engineering: power components and/or systems
- PE7\_3 Simulation engineering and modelling
- PE7\_4 (Micro- and nano-) systems engineering
- PE7\_5 (Micro- and nano-) electronic, optoelectronic and photonic components
- PE7\_6 Communication technology, high-frequency technology
- PE7\_7 Signal processing
- PE7\_8 Networks (communication networks, sensor networks, networks of robots, etc.)
- PE7\_9 Man-machine interfaces
- PE7\_10 Robotics
- PE7\_11 Components and systems for applications (in e.g. medicine, biology, environment)
- PE7\_12 Electrical energy production, distribution, application

### **PE8 Products and Processes Engineering**

Product design, process design and control, construction methods, civil engineering, energy processes, material engineering

- PE8\_1 Aerospace engineering
- PE8\_2 Chemical engineering, technical chemistry
- PE8\_3 Civil engineering, architecture, maritime/hydraulic engineering, geotechnics, waste treatment
- PE8\_4 Computational engineering
- PE8\_5 Fluid mechanics, hydraulic-, turbo-, and piston-engines
- PE8\_6 Energy processes engineering
- PE8\_7 Mechanical and manufacturing engineering (shaping, mounting, joining, separation)
- PE8\_8 Materials engineering (biomaterials, metals, ceramics, polymers, composites, etc.)
- PE8\_9 Production technology, process engineering
- PE8\_10 Industrial design (product design, ergonomics, man-machine interfaces, etc.)
- PE8\_11 Sustainable design (for recycling, for environment, eco-design)
- PE8\_12 Lightweight construction, textile technology
- PE8\_13 Industrial bioengineering

### **PE9 Universe Sciences**

Astro-physics/chemistry/biology; solar system; stellar, galactic and extragalactic astronomy, planetary systems, cosmology, space science, instrumentation

- PE9\_1 Solar and interplanetary physics
- PE9\_2 Planetary systems sciences
- PE9\_3 Interstellar medium
- PE9\_4 Formation of stars and planets
- PE9\_5 Astrobiology

- PE9\_6 Stars and stellar systems
- PE9\_7 The Galaxy
- PE9\_8 Formation and evolution of galaxies
- PE9\_9 Clusters of galaxies and large scale structures
- PE9\_10 High energy and particles astronomy – X-rays, cosmic rays, gamma rays, neutrinos
- PE9\_11 Relativistic astrophysics
- PE9\_12 Dark matter, dark energy
- PE9\_13 Gravitational astronomy
- PE9\_14 Cosmology
- PE9\_15 Space Sciences
- PE9\_16 Very large data bases: archiving, handling and analysis
- PE9\_17 Instrumentation - telescopes, detectors and techniques

## **PE10 Earth System Science**

Physical geography, geology, geophysics, atmospheric sciences, oceanography, climatology, cryology, ecology, global environmental change, biogeochemical cycles, natural resources management

- PE10\_1 Atmospheric chemistry, atmospheric composition, air pollution
- PE10\_2 Meteorology, atmospheric physics and dynamics
- PE10\_3 Climatology and climate change
- PE10\_4 Terrestrial ecology, land cover change
- PE10\_5 Geology, tectonics, volcanology
- PE10\_6 Palaeoclimatology, palaeoecology
- PE10\_7 Physics of earth's interior, seismology, volcanology
- PE10\_8 Oceanography (physical, chemical, biological, geological)
- PE10\_9 Biogeochemistry, biogeochemical cycles, environmental chemistry
- PE10\_10 Mineralogy, petrology, igneous petrology, metamorphic petrology
- PE10\_11 Geochemistry, crystal chemistry, isotope geochemistry, thermodynamics
- PE10\_12 Sedimentology, soil science, palaeontology, earth evolution
- PE10\_13 Physical geography
- PE10\_14 Earth observations from space/remote sensing
- PE10\_15 Geomagnetism, palaeomagnetism
- PE10\_16 Ozone, upper atmosphere, ionosphere
- PE10\_17 Hydrology, water and soil pollution
- PE10\_18 Cryosphere, dynamics of snow and ice cover, sea ice, permafrosts and ice sheets

## **LS - Life Sciences**

**LS1 Molecular Biology, Biochemistry, Structural Biology and Molecular Biophysics** Molecular synthesis, modification, mechanisms and interactions, biochemistry, structural biology, molecular biophysics signalling pathways

- LS1\_1 Macromolecular complexes including interactions involving nucleic acids, proteins, lipids and carbohydrates
- LS1\_2 Biochemistry
- LS1\_3 DNA synthesis, modification, repair, recombination, degradation
- LS1\_4 RNA synthesis, processing, modification, degradation
- LS1\_5 Protein synthesis, modification, turnover
- LS1\_6 Lipid biology
- LS1\_7 Glycobiology
- LS1\_8 Molecular biophysics (e.g. single-molecule approaches, bioenergetics, fluorescence)
- LS1\_9 Structural biology and its methodologies (e.g. crystallography, cryo-EM, NMR and new technologies)
- LS1\_10 Molecular mechanisms of signalling pathways
- LS1\_11 Fundamental aspects of synthetic biology and chemical biology

## **LS2 Genetics, 'Omics', Bioinformatics and Systems Biology**

Molecular genetics, quantitative genetics, genetic epidemiology, epigenetics, genomics, metagenomics,

transcriptomics, proteomics, metabolomics, glycomics, bioinformatics, computational biology, biostatistics, systems biology

- LS2\_1 Molecular genetics, reverse genetics, forward genetics, genome editing
- LS2\_2 Non-coding RNAs
- LS2\_3 Quantitative genetics
- LS2\_4 Genetic epidemiology
- LS2\_5 Epigenetics and gene regulation
- LS2\_6 Genomics (e.g. comparative genomics, functional genomics)
- LS2\_7 Metagenomics
- LS2\_8 Transcriptomics
- LS2\_9 Proteomics
- LS2\_10 Metabolomics
- LS2\_11 Glycomics/Lipidomics
- LS2\_12 Bioinformatics
- LS2\_13 Computational biology
- LS2\_14 Biostatistics
- LS2\_15 Systems biology

### **LS3 Cellular and Developmental Biology**

Cell biology, cell physiology, signal transduction, organogenesis, developmental genetics, pattern formation and stem cell biology, in plants and animals, or, where appropriate, in microorganisms

- LS3\_1 Morphology and functional imaging of cells and tissues
- LS3\_2 Cytoskeleton and cell behaviour (e.g. control of cell shape, cell migration and cellular mechanosensing)
- LS3\_3 Organelle biology and trafficking
- LS3\_4 Cell junctions, cell adhesion, cell communication and the extracellular matrix
- LS3\_5 Cell signalling and signal transduction
- LS3\_6 Cell cycle, division and growth
- LS3\_7 Cell death (including senescence) and autophagy
- LS3\_8 Cell differentiation, physiology and dynamics
- LS3\_9 Developmental genetics in animals and plants
- LS3\_10 Embryology and pattern formation in animals and plants
- LS3\_11 Tissue organisation and morphogenesis in animals and plants (including biophysical approaches)
- LS3\_12 Stem cell biology in development, tissue regeneration and ageing, and fundamental aspects of stem cell-based therapies

### **LS4 Physiology, Pathophysiology and Endocrinology**

Organ physiology, pathophysiology, endocrinology, metabolism, ageing, tumorigenesis, cardiovascular diseases, metabolic syndromes

- LS4\_1 Organ physiology and pathophysiology
- LS4\_2 Comparative physiology and pathophysiology
- LS4\_3 Molecular aspects of endocrinology
- LS4\_4 Fundamental mechanisms underlying ageing
- LS4\_5 Metabolism, biological basis of metabolism-related disorders
- LS4\_6 Fundamental mechanisms underlying cancer
- LS4\_7 Fundamental mechanisms underlying cardiovascular diseases
- LS4\_8 Non-communicable diseases (except for neural/psychiatric and immunity-related diseases)

### **LS5 Neuroscience and Neural Disorders**

Neural cell function and signalling, systems neuroscience, neural bases of cognitive and behavioural processes, neurological and psychiatric disorders

- LS5\_1 Neural cell function, communication and signalling, neurotransmission in neuronal and/or glial cells
- LS5\_2 Systems neuroscience and computational neuroscience (e.g. neural networks, neural modelling)
- LS5\_3 Neuronal development, plasticity and regeneration
- LS5\_4 Sensation and perception (e.g. sensory systems, sensory processing, pain)
- LS5\_5 Neural bases of cognitive processes (e.g. memory, learning, attention)

- LS5\_6 Neural bases of behaviour (e.g. sleep, consciousness, addiction)
- LS5\_7 Neurological disorders (e.g. neurodegenerative diseases, seizures)
- LS5\_8 Psychiatric disorders (e.g. affective and anxiety disorders, autism, psychotic disorders)
- LS5\_9 Neurotrauma and neurovascular conditions (including injury, blood-brain barrier, stroke, neurorehabilitation)

### **LS6 Immunity and Infection**

The immune system and related disorders, biology of infectious agents and infection, biological basis of prevention and treatment of infectious diseases

- LS6\_1 Innate immunity in animals and plants
- LS6\_2 Adaptive immunity
- LS6\_3 Regulation and effector functions of the immune response (e.g. cytokines, interferons and chemokines, inflammation, immune signalling, helper T cells, immunological memory, immunological tolerance, cell-mediated cytotoxicity, complement)
- LS6\_4 Immunological mechanisms in disease (e.g. autoimmunity, allergy, transplantation immunology, tumour immunology)
- LS6\_5 Biology of pathogens (e.g. bacteria, viruses, parasites, fungi)
- LS6\_6 Mechanisms of infection (e.g. transmission, virulence factors, host defences, immunity to pathogens, molecular pathogenesis)
- LS6\_7 Biological basis of prevention and treatment of infection (e.g. infection natural cycle, reservoirs, vectors, vaccines, antimicrobials)
- LS6\_8 Infectious diseases in animals and plants

### **LS7 Applied Medical Technologies, Diagnostics, Therapies and Public Health**

Development of tools for diagnosis, monitoring and treatment of diseases, pharmacology, clinical medicine, regenerative medicine, epidemiology and public health

- LS7\_1 Imaging for medical diagnosis
- LS7\_2 Genetic tools for medical diagnosis
- LS7\_3 Other medical technologies for diagnosis and monitoring of diseases
- LS7\_4 Pharmacology and pharmacogenomics (including drug discovery and design, drug delivery and therapy, toxicology)
- LS7\_5 Applied gene and cell therapies, regenerative medicine
- LS7\_6 Radiation therapy
- LS7\_7 Analgesia and surgery
- LS7\_8 Epidemiology and public health
- LS7\_9 Environmental health, occupational medicine
- LS7\_10 Health services, health care research, medical ethics

### **LS8 Ecology, Evolution and Environmental Biology**

Population, community and ecosystem ecology, evolutionary biology, behavioural ecology, microbial ecology

- LS8\_1 Ecosystem and community ecology, macroecology
- LS8\_2 Biodiversity, conservation biology, conservation genetics
- LS8\_3 Population biology, population dynamics, population genetics
- LS8\_4 Evolutionary ecology
- LS8\_5 Evolutionary genetics
- LS8\_6 Phylogenetics, systematics, comparative biology
- LS8\_7 Macroevolution, paleobiology
- LS8\_8 Coevolution, biological mechanisms and ecology of species interactions (e.g. symbiosis, parasitism, mutualism, food-webs)
- LS8\_9 Behavioural ecology and evolution
- LS8\_10 Microbial ecology and evolution
- LS8\_11 Marine biology and ecology

**LS9 Applied Life Sciences, Biotechnology, and Molecular and Biosystems Engineering** Applied plant and animal sciences, forestry, food sciences, applied biotechnology, environmental, and marine

biotechnology, applied bioengineering, biomass and biofuels, biohazards

- LS9\_1 Applied biotechnology (including transgenic organisms, applied genetics and genomics, biosensors, bioreactors, microbiology, bioactive compounds)
- LS9\_2 Applied bioengineering, synthetic biology, chemical biology, nanobiotechnology, metabolic engineering, protein and glyco-engineering, tissue engineering, biocatalysis, biomimetics
- LS9\_3 Applied animal sciences (including animal breeding, veterinary sciences, animal husbandry, animal welfare, aquaculture, fisheries, insect gene drive)
- LS9\_4 Applied plant sciences (including crop production, plant breeding, agroecology, forestry, soil biology)
- LS9\_5 Food sciences (including food technology, food safety, nutrition)
- LS9\_6 Biomass production and utilisation, biofuels
- LS9\_7 Environmental biotechnology (including bioindicators, bioremediation, biodegradation)
- LS9\_8 Biohazards (including biological containment, biosafety, biosecurity)
- LS9\_9 Marine biotechnology (including marine bioproducts, feed resources, genome mining)

## **SH - Social Sciences and Humanities**

### **SH1 Individuals, Markets and Organisations**

Economics, finance and management

- SH1\_1 Macroeconomics; monetary economics; economic growth
- SH1\_2 International management; international trade; international business; spatial economics
- SH1\_3 Development economics, health economics, education economics
- SH1\_4 Financial economics; banking; corporate finance; international finance; accounting; auditing; insurance
- SH1\_5 Labour and demographic economics; human resource management
- SH1\_6 Econometrics; operations research
- SH1\_7 Behavioural economics; experimental economics; neuro-economics
- SH1\_8 Microeconomics; game theory
- SH1\_9 Industrial organisation; strategy; entrepreneurship
- SH1\_10 Management; marketing; organisational behaviour; operations management
- SH1\_11 Technological change, innovation, research & development
- SH1\_12 Agricultural economics; energy economics; environmental economics
- SH1\_13 Public economics; political economics; law and economics
- SH1\_14 Competition law, contract law, trade law, Intellectual Property Rights
- SH1\_15 Quantitative economic history and history of economics; institutional economics; economic systems

### **SH2 Institutions, Values, Environment and Space**

Political science, law, sustainability science, geography, regional studies and planning

- SH2\_1 Political systems, governance
- SH2\_2 Democratisation and social movements
- SH2\_3 Conflict resolution, war, peace building
- SH2\_4 Constitutions, human rights, comparative law, humanitarian law, anti-discrimination law
- SH2\_5 International relations, global and transnational governance
- SH2\_6 Sustainability sciences, environment and resources
- SH2\_7 Environmental and climate change, societal impact and policy
- SH2\_8 Energy, transportation and mobility
- SH2\_9 Urban, regional and rural studies
- SH2\_10 Land use and regional planning
- SH2\_11 Human, economic and social geography
- SH2\_12 GIS, spatial analysis; big data in political, geographical and legal studies

### **SH3 The Social World, Diversity, Population**

Sociology, social psychology, social anthropology, demography, education, communication

- SH3\_1 Social structure, social mobility
- SH3\_2 Inequalities, discrimination, prejudice, aggression and violence, antisocial behaviour
- SH3\_3 Social integration, exclusion, prosocial behaviour

- SH3\_4 Attitudes and beliefs
- SH3\_5 Social influence; power and group behaviour
- SH3\_6 Kinship; diversity and identities, gender, interethnic relations
- SH3\_7 Social policies, welfare
- SH3\_8 Population dynamics; households, family and fertility
- SH3\_9 Health, ageing and society
- SH3\_10 Religious studies, ritual; symbolic representation
- SH3\_11 Social aspects of learning, curriculum studies, educational policies
- SH3\_12 Communication and information, networks, media
- SH3\_13 Digital social research
- SH3\_14 Science and technology studies

#### **SH4 The Human Mind and Its Complexity**

Cognitive science, psychology, linguistics, philosophy of mind

- SH4\_1 Cognitive basis of human development and education, developmental disorders; comparative cognition
- SH4\_2 Personality and social cognition; emotion
- SH4\_3 Clinical and health psychology
- SH4\_4 Neuropsychology
- SH4\_5 Attention, perception, action, consciousness
- SH4\_6 Learning, memory; cognition in ageing
- SH4\_7 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 Philosophy of mind, philosophy of language
- SH4\_13 Philosophy of science, epistemology, logic

#### **SH5 Cultures and Cultural Production**

Literature, philology, cultural studies, study of the arts, philosophy

- SH5\_1 Classics, ancient literature and art
- SH5\_2 Theory and history of literature, comparative literature
- SH5\_3 Philology and palaeography
- SH5\_4 Visual and performing arts, film, design
- SH5\_5 Music and musicology; history of music
- 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; social and political philosophy
- SH5\_11 History of philosophy
- SH5\_12 Computational modelling and digitisation in the cultural sphere

#### **SH6 The Study of the Human Past**

Archaeology and history

- SH6\_1 Historiography, theory and methods in history, including the analysis of digital data
- SH6\_2 Classical archaeology, history of archaeology
- SH6\_3 General archaeology, archaeometry, landscape archaeology
- SH6\_4 Prehistory, palaeoanthropology, palaeodemography, protohistory
- SH6\_5 Ancient history
- SH6\_6 Medieval history SH6\_7 Early modern history
- SH6\_8 Modern and contemporary history SH6\_9 Colonial and post-colonial history
- SH6\_10 Global history, transnational history, comparative history, entangled histories

SH6\_11 Social and economic history

SH6\_12 Gender history; cultural history; history of collective identities and memories

SH6\_13 History of ideas, intellectual history, history of economic thought

SH6\_14 History of science, medicine and technologies